ENGINEERING AND MINING JOURNAL

A McGRAW HILL PUBLICATION

MAY 1947

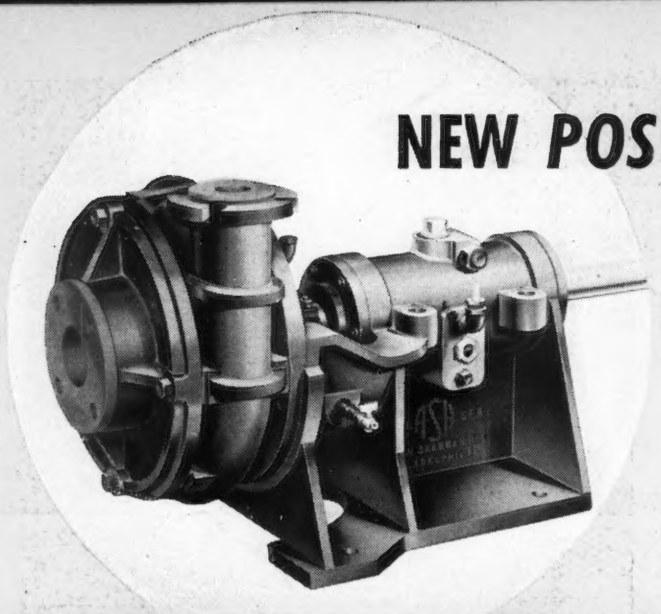
Science Library

MAY 15 1947

New blast furnace under construction at South Chicago steel works—a step in modernization. U. S. Steel photo

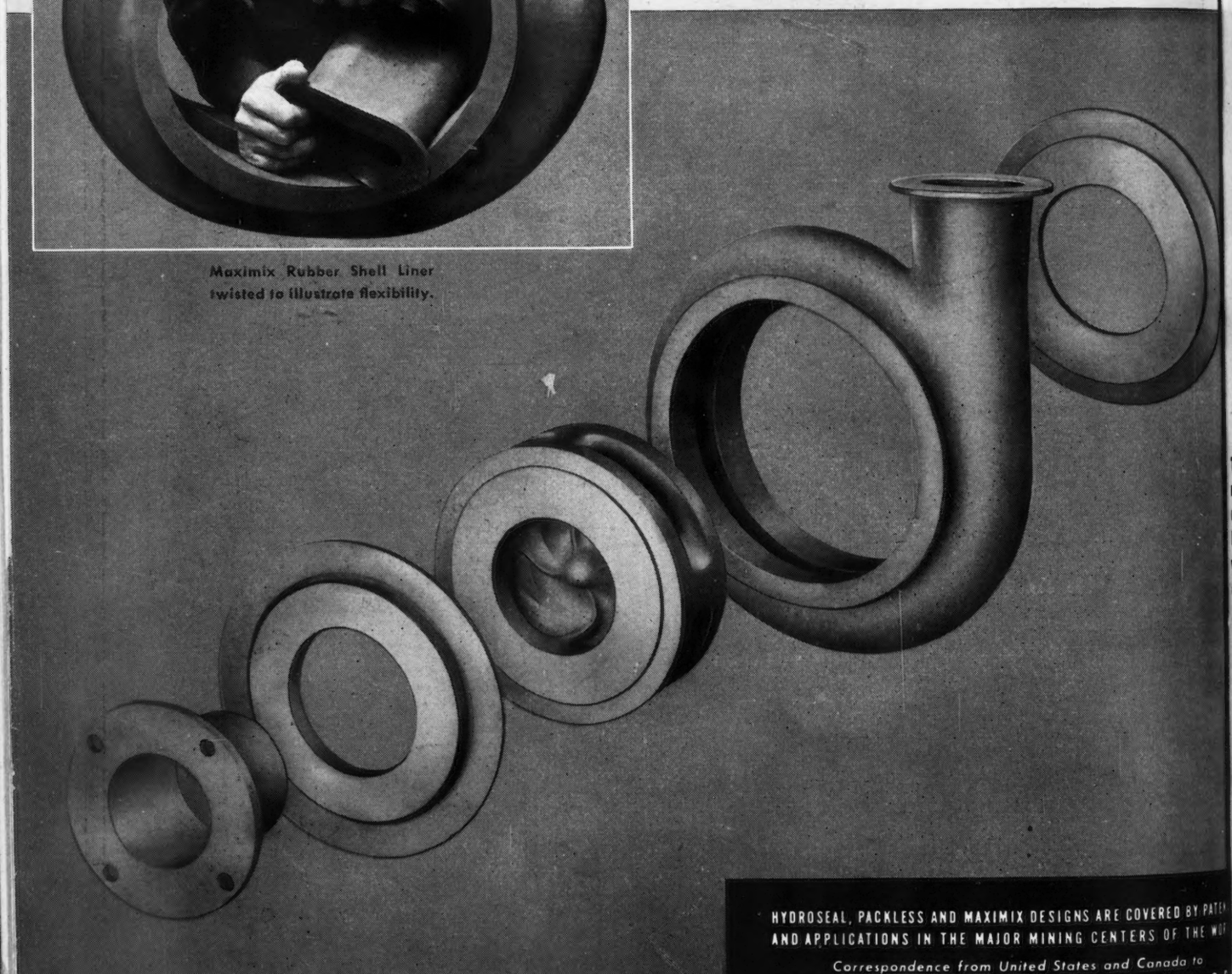
New Applications of Scraper Hoists—Page 60

NEW *POST-WAR* HYDROSEAL PUMP



It looks exactly like its predecessor, doesn't it? Fundamentally it is. High efficiency, Hydroseal-ing, low maintenance, long life are still charac-teristics. However, new improved bearings, both radial and thrust, new adjustment of shaft and bearing assembly, new mounting and other new improvements and refinements are built into this post-war Hydroseal Pump. You would not be satisfied, nor would we, unless we gave all of this information to you in detail first-hand. Remind us to tell you also about the new Hydroseal Slurry Pump with its new seal which makes dilution infinitesimal.

Maximix Rubber Shell Liner twisted to illustrate flexibility.



Exploded photographs of Maximix Rubber Parts for Slurry Pump, showing, left to right, Suction Sleeve, Suction Bell Liner, Impeller, Shell Liner and Engine Bell Liner.

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATE
AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WO

Correspondence from United States and Canada to

ALLEN-SHERMAN-HOFF CO., 229 S. 15th St., Phila. 2, P

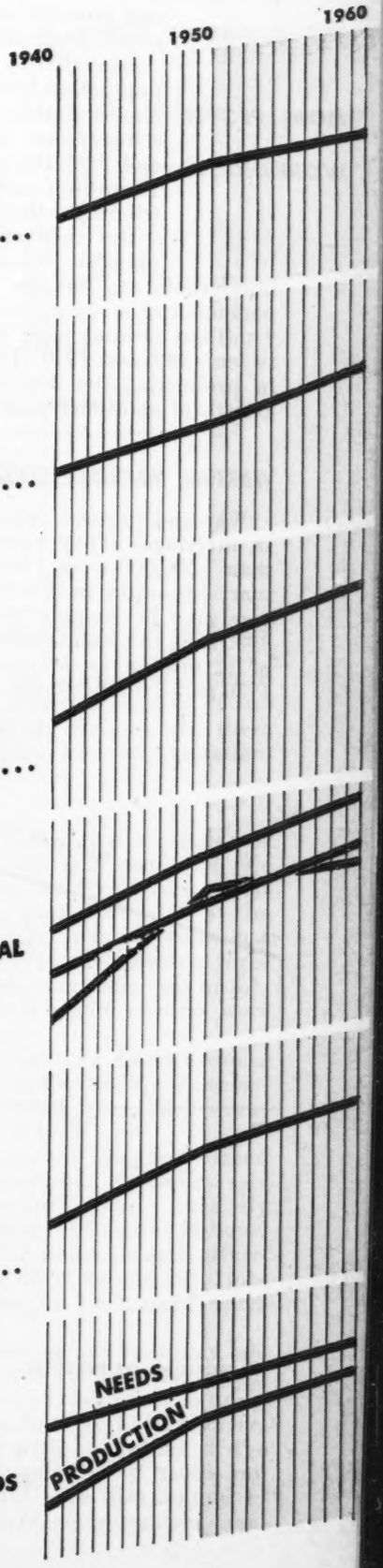
Correspondence from anywhere else in the World to

A-S-H EXPORT CO., 229 S. 15th St., Phila. 2,

CABLE ADDRESS: ASH, PHILADELPHIA BENTLEY'S CODE

1950-1960

The Twentieth Century Fund, a privately-endowed research foundation, has just completed a monumental 875-page work called "America's Needs and Resources." In it is presented a detailed preview of what economic life in the U. S. A. during the 1950-60 decade will be like if we succeed in maintaining high-level employment. From the findings of the Twentieth Century Fund survey, the McGraw-Hill Department of Economics has prepared this synopsis, which highlights points of interest to readers of this magazine.



POPULATION

A nation's wealth depends more than anything else on the size and vigor of its population. Much of the increase in U. S. production during the past hundred years is a result of a rapid growth in population. This growth supplied manpower for farms and factories and provided an expanding market for consumer goods and services.

MORE PEOPLE WORKING . . .

Growth was the outstanding fact about population before 1930. The birth rate was almost double the death rate and there was a heavy flow of immigrants. Between 1900 and 1930, the population increase averaged 15 million each decade. Immigration contributed a third of the increase.

But this trend was checked by the depression 30's which stemmed the flood of immigrants and cut the birth rate by forcing postponement of many marriages. As a result, fewer than 9 million persons were added to the population between 1930 and 1940. This was an important factor in prolonging the depression because it slowed the growth of consumer markets.

WARTIME MARRIAGE BOOM

War and postwar conditions have brought a boom in marriages. They have exceeded normal by more than 1,500,000 since 1940. There will be more newly-married couples in 1950 than ever before and the birth rate may be roughly 10% higher than in the early 1930's. So the 20th Century Fund looks for an increase of 12 million in total population between 1940 and 1950 and a further increase of 10 million in the 1950's.

This will mean a faster-growing market for homes, autos, food, clothing, and other consumer items than we had in the 1930's. It will mean crowded schools and more people seeking jobs.

There are four major population trends which will affect markets in the 1950's:

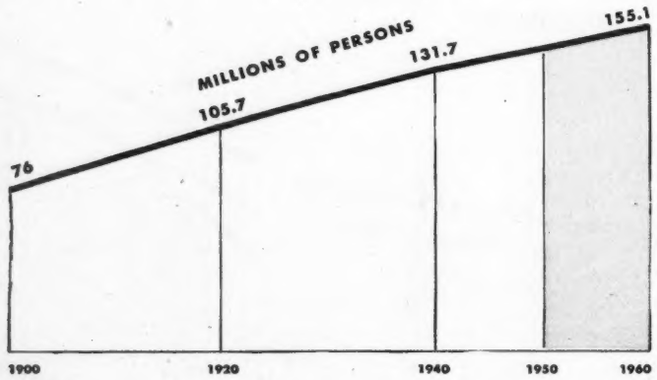
1. The number of families will continue to increase more rapidly than the number of people as families grow smaller. This is significant because the market for housing, appliances, and many other things depends more on the number of families than on the number of people.

2. Our population will be getting older. But it will not be getting less productive because the proportion of the population between the ages of 20 and 60 will be higher than in past decades. Still, the most striking increase will take place in the number of people over 60—from 14 million in 1940 to more than 20 million in 1960. This will bring greater demand for medical services and social security. An important cause of this trend is our success in controlling communicable disease. The following table shows how the death rate from selected causes has changed since 1900.

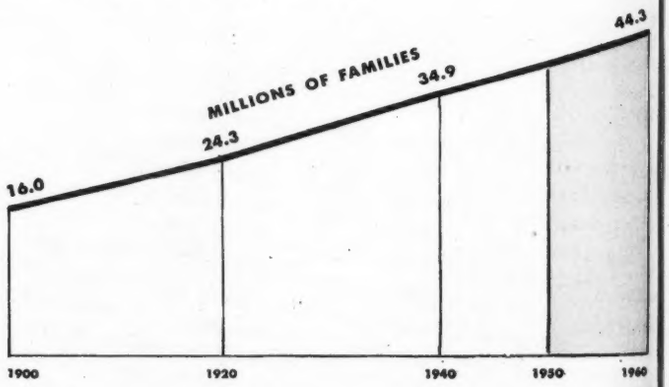
Death Rate Per 100,000 Persons

	1942	*1900*
Diseases of heart	295	137
Cancer and other malignant tumors	122	64
Influenza	56	202
Tuberculosis	43	194
Diarrhea and enteritis	9	143
Whooping cough	2	12
Diphtheria	1	40
Measles	1	13
Typhoid and paratyphoid fever	0.5	31
Scarlet fever	0.3	10
Other	505.2	873
	1035.0	1719

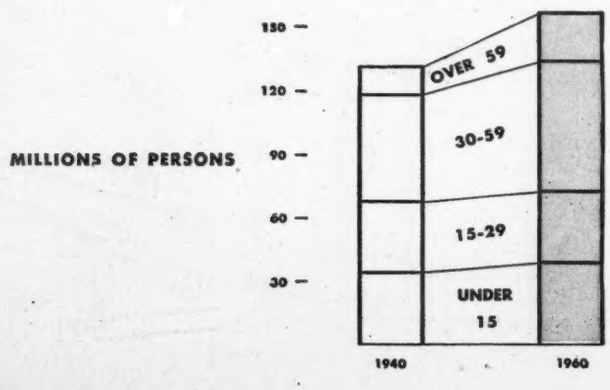
TWICE AS MANY PEOPLE



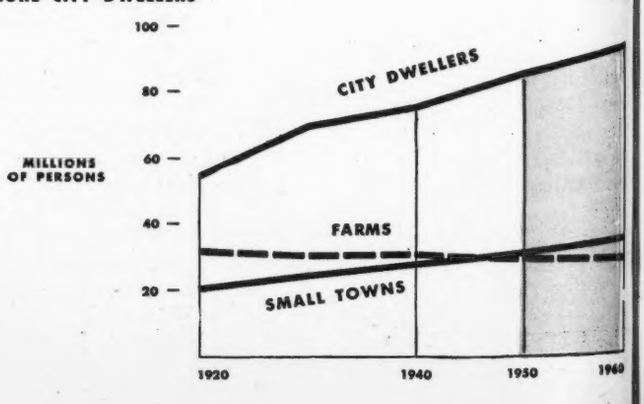
BUT THREE TIMES AS MANY FAMILIES



MORE OLDER PEOPLE

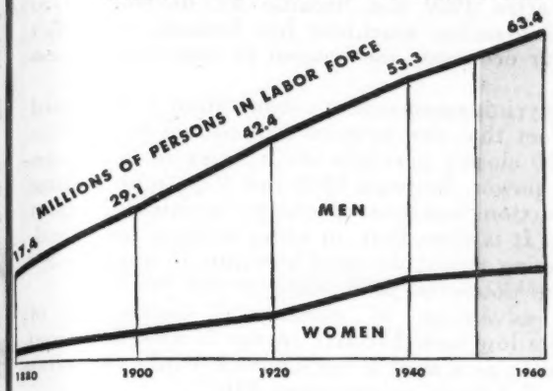


MORE CITY DWELLERS

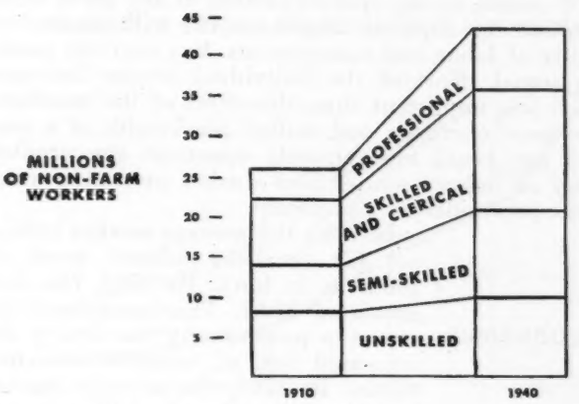


ANATOMY OF THE LABOR FORCE

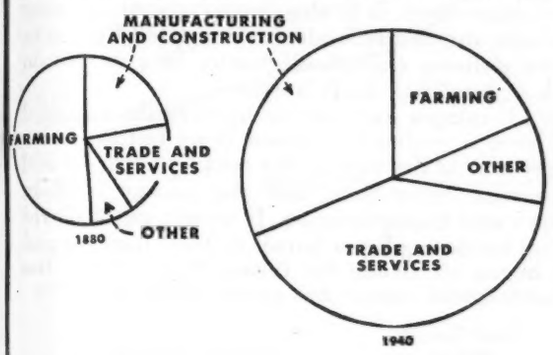
MORE AND MORE WOMEN ARE SEEKING JOBS



THE LABOR FORCE IS GROWING MORE SKILLED



FARMING IS GIVING WAY TO OTHER OCCUPATIONS



3. The population will continue to become more urbanized. Small and medium-sized cities will grow faster than the largest cities. The general westward migration which was accelerated by the war will continue.

4. Our people will keep on getting more homogeneous. There has been almost no immigration since 1929, so the number of immigrants who have been in the country for less than 20 years will make up less than one percent of the population in 1950 as against 10% in 1930.

An even more important factor in making the population all of a kind has been the growth of universal education. The proportion of children 14-17 years old attending high school doubled between 1920 and 1936. The rise of the radio, movies, and national magazines has also levelled us out. These developments not only raise the general educational level of the nation but also tend to standardize the public's tastes and attitudes.

LABOR FORCE

The volume of goods and services produced by 145 million persons in 1950 and 155 million in 1960 will depend on what share of the population is in the labor market and the amount of work those employed actually do. The proportion of the population in the labor force has shown little change in the past few decades. So the 20th Century Fund assumes that the relationship between labor force and population will be about the same in 1950 and 1960 as it was just before the war. On this basis 60 million people will be in the labor market in 1950 and 63.4 million ten years later.

As you can see from the charts, however, there will be several important changes in the composition of the labor force. More women will be working. In 1870 only one out of every eight worked. By 1940 the proportion had grown to one out of four, and evidently will go on rising.

However, the increase in the number of women working will just about be offset by earlier retirements and longer schooling. This explains why there is little change in the ratio of labor force to population.

UNEMPLOYMENT

The effectiveness of the labor force depends not only on its size but on how fully it is employed. We have never had full employment in the sense that everyone able and willing to work had a job at the same time. Even in good years unemployment has seldom averaged less than 5% of the working force because workers are always moving from job to job. And in 1932, nearly one-fourth of all workers were unable to find jobs.

For this reason, the 20th Century Fund assumes that, even with good business in the 1950s, unemployment will average 5% of the labor force. This works out to 3 million unemployed in 1950.

In addition, the Fund expects the long down-trend in average weekly hours to continue. A century ago, workers put in a 12 hour day for 6 days a week. By 1940 the average work-week had declined to 44 hours in non-agricultural jobs and 52 hours in agriculture. If this trend continues, the average in non-farm jobs will be down to 38 hours a week in 1960, and farmers will work 48 hours.

Adding all this up, and allowing for vacations, absenteeism, and sickness, the 20th Century Fund estimates that the U. S. will put in 121 billion man-hours of work in 1950 and 118 billion in 1960. This compares with 105 billion in 1940 and with 154 billion at the peak of the war effort. The quantity of goods and services that can be turned out with this amount of labor effort will depend on average output per man-hour, or productivity.

PRODUCTIVITY

The key to our future economic welfare is productivity. It is the five-fold increase in output per man-hour that has made it possible for us to work shorter hours and still enjoy a rising standard of living. This increase in productivity has been accomplished not by working harder but by constantly inventing better machinery to supplement human energy with mechanical power.

Of course, in any specific factory at any given time, productivity depends largely on the willingness and ability of labor and management. But over the years, the actual effort of the individual worker becomes much less important than the effort of the machine. The most energetic and skilled blacksmith of a century ago could not remotely approach the productivity of today's semi-skilled worker operating automatic power-driven equipment.

EACH PRODUCING MORE . . .

In 1860, the average worker turned out 33¢ (in 1944 dollars) worth of goods in an hour. By 1940, this had grown to $1.22. This sensational increase in productivity was due to the increased use of power-driven machines. In 1860, the average worker had the help of only half a horsepower of animal or mineral energy. In 1940, he had the use of 2.7 horsepower. To put it another way, if there had been no increase in the use of mechanical power since 1850, it would have taken 290 million workers to turn out the amount of goods and services actually produced at the peak of the war effort by only 63 million workers.

DO MACHINES KILL JOBS

Past history also shows that we need not fear the long run effects of the introduction of labor-saving machines. On the contrary, the only way we can improve the material welfare of everyone is to continue and even step up the rate at which we save labor by using machines.

Some people, it is true, are thrown out of work and a few of them may not be able to find other jobs easily. But mechanization more than compensates for "technological unemployment" by making it possible to produce more and better things for everyone—things that themselves create jobs. Development of the railroads and the automobile, for example, put a lot of canal boat and livery stable operators out of business. But it cut the cost of transportation and created many times more jobs than it eliminated.

The 20th Century Fund also points out that the most important reason that the technological revolution developed luxuriantly in the U. S. between 1850 and 1940 was that competitive enterprise provided a generally favorable climate. It is true that natural resources were plentiful and that the population was growing rapidly both in numbers and in skill. But what we had to a unique degree here was an atmosphere which favored risk-taking, fostered the vast capital investment necessary to harness and apply mechanical energy, and provided the incentives necessary to put capital and inventiveness to work.

No other economy has equalled ours in the ability to produce more and more with continually diminishing human effort. The test it now faces is whether it can eliminate the ups and downs in production and employment that have gone along with it. But an abundance of evidence indicates that we ran into trouble after 1929 not because we developed too many labor-saving machines but because we didn't adjust our economic mechanism to keep the process going.

The key importance of mechanization is indicated by the fact that the increase in national production since 1860 closely parallels the increase in use of mechanical power. Between 1860 and 1940, both volume of production and use of energy multiplied about 11 times. It is clear that, in order to keep our standard of living rising, we must continue to apply more and more power to production.

Chief advantage of mechanical energy is, of course, its low cost. Electric energy is now delivered for as little as a cent a horsepower, while the same amount of human energy costs $10.

And there are other important advantages. Mechanical energy can be delivered in greater concentrations than any other form. It is also more convenient, compact, mobile, and controllable. Consolidated Edison in New York delivers enough electricity in a day to do the work of 3 million draft horses.

These advantages are now so universally accepted that it's hard to realize how recently we left the horse and buggy era. At the turn of the century, animals and men provided more than half the energy used in production and transportation. It wasn't until World War I that trucks replaced horses in local hauling and tractors began to invade the farms. Here is how the use of mechanical energy has grown since 1850:

	Total Energy Output (Billions of Horsepower-Hours)	Percent Supplied by:		
		Mechanical Energy	Humans	Animals
1850	17.6	6	15	79
1860	25.2	7	14	79
1870	27.8	12	15	73
1880	39.9	17	14	69
1890	61.1	28	12	60
1900	82.9	38	10	52
1910	131.4	57	8	35
1920	197.4	73	6	21
1930	238.3	84	5	11
1940	289.4	90	4	6
1950	410.4	94	3	3
1960	489.8	96	2	2

PRODUCTIVITY IN THE FUTURE

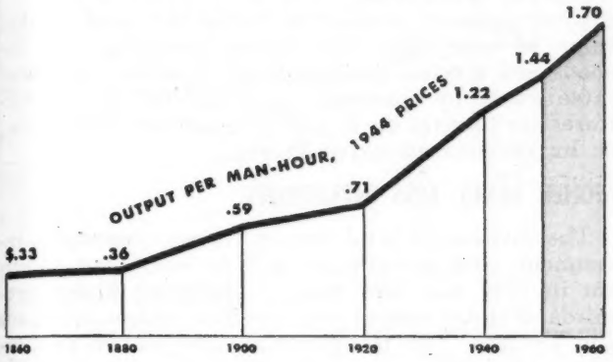
Any attempt to predict future developments in productivity is complicated by the fact that the changes do not occur at an even rate. Between 1850 and 1940 the average increase in output per man-hour was 18% per decade. But the changes varied all the way from 3% between 1870 and 1880 to 42% for the decade ending in 1940. There is, therefore, no simple way to extend past trends to obtain a foolproof figure for productivity at a future date.

For purposes of this study, however, the 20th Century Fund assumes that the average rate of increase since 1850 may be projected to estimate output per man-hour in 1950 and 1960. Thus, output per man-hour works out to $1.44 in 1950 and $1.70 in 1960 as against $1.22 in 1940 (all in 1944 dollars).

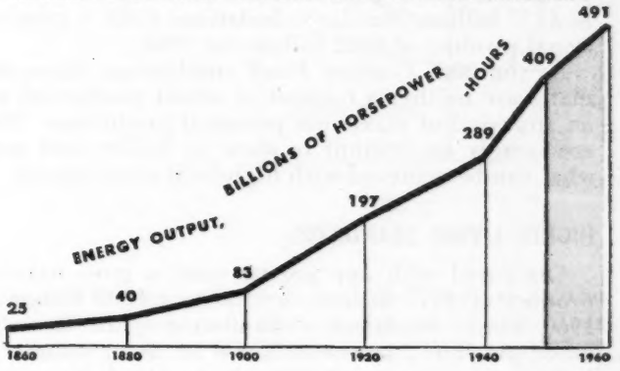
As the Fund points out, this is a critical assumption, and it is further complicated by the fact that there is a wider possibility of error in this estimate than in most of the others in the study. If, for example, it is assumed that productivity will increase at the pace set from 1920 to 1940 which averaged 36% per decade, then 1960 production would be about double the 1940 level instead of only 157% of it, as the 20th Century Fund estimates.

A CENTURY OF ECONOMIC PROGRESS 1860 – 1960

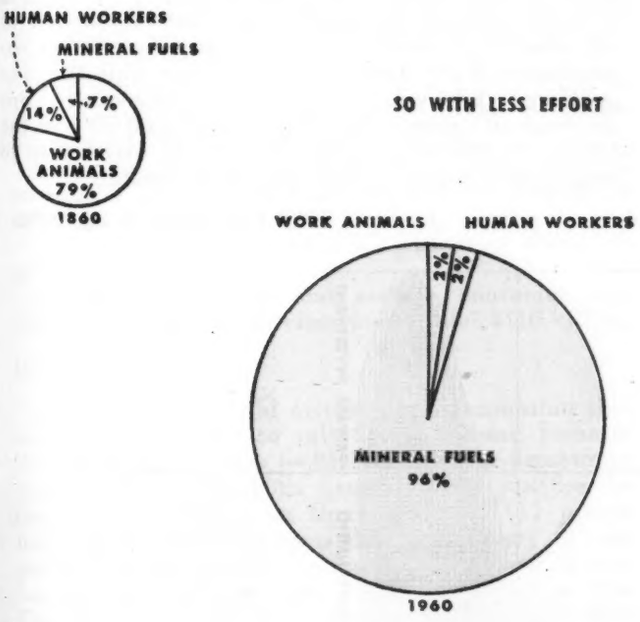
OUTPUT PER MAN-HOUR SHOULD BE 5 TIMES AS GREAT



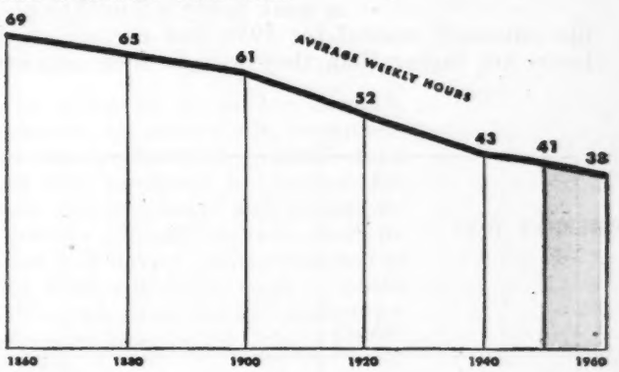
BECAUSE OF A STEADY GROWTH OF POWER AND MACHINES



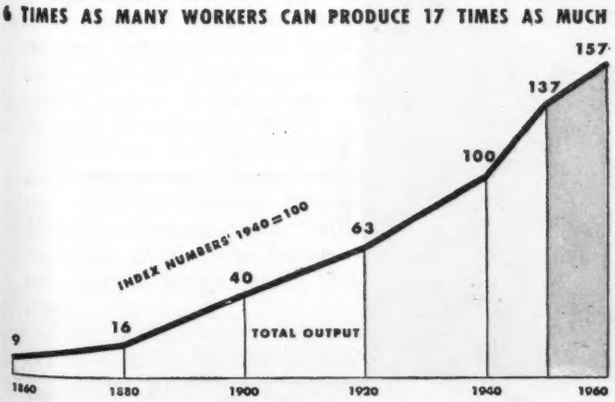
SO WITH LESS EFFORT



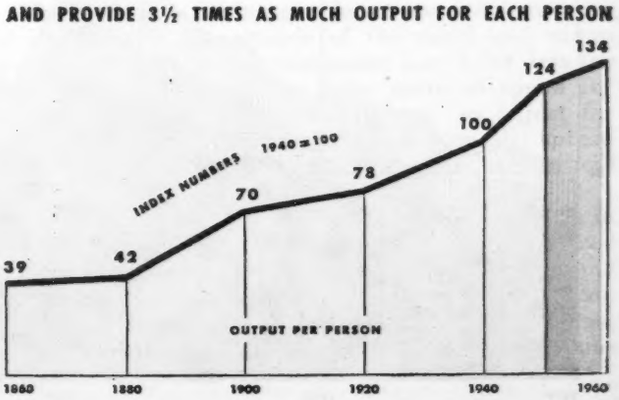
AND A SHORTER WORK WEEK



6 TIMES AS MANY WORKERS CAN PRODUCE 17 TIMES AS MUCH



AND PROVIDE 3½ TIMES AS MUCH OUTPUT FOR EACH PERSON



TOTAL NATIONAL OUTPUT

The potential volume of goods and services in 1950 and 1960 can be determined by simple arithmetic, using the assumptions outlined on the preceding pages. Of an estimated population of 145 million in 1950, about 60 million persons will be in the labor market and 57 million of them will have jobs if we succeed in keeping business activity at a high level.

This many people would work 121 billion man-hours. With output per man-hour estimated at $1.44 (in 1944 dollars) the total value of goods and services produced, or the gross national product, would come to $177 billion. Similar calculations yield a gross national product of $202 billion for 1960.

As the 20th Century Fund emphasizes, these estimates are neither a forecast of actual production nor an appraisal of maximum potential production. They are merely an attempt to show in dollars and cents what can be achieved with high-level employment.

HIGHER LIVING STANDARDS

Compared with any prewar year, a gross national product of $177 billion in 1950 and $202 billion in 1960 would represent a handsome gain. It would make possible a substantial rise in living standards. In 1950 we would produce a fifth more than in 1941.

CAN TURN OUT ENOUGH GOODS AND SERVICES . . .

However, the volume of goods and services turned out in 1950 would be only slightly higher than present production. This is because the number of persons at work today is 2 million above the estimated normal for 1950, and average weekly hours are higher than they will be then. Almost a million and a half of the emergency workers drawn into the labor force during the war are still at work and unemployment is lower than the figure assumed for 1950.

The estimates of 1950 and 1960 gross national product, as well as the figures for past years used in the chart, are expressed in 1944 prices. This is not a prediction that the price level will settle down to the 1944 level which would involve a drop of 18% in the cost of living and 26% in wholesale prices. It is merely a device to eliminate price fluctuations so that the figures will show only the actual changes in the physical volume of production.

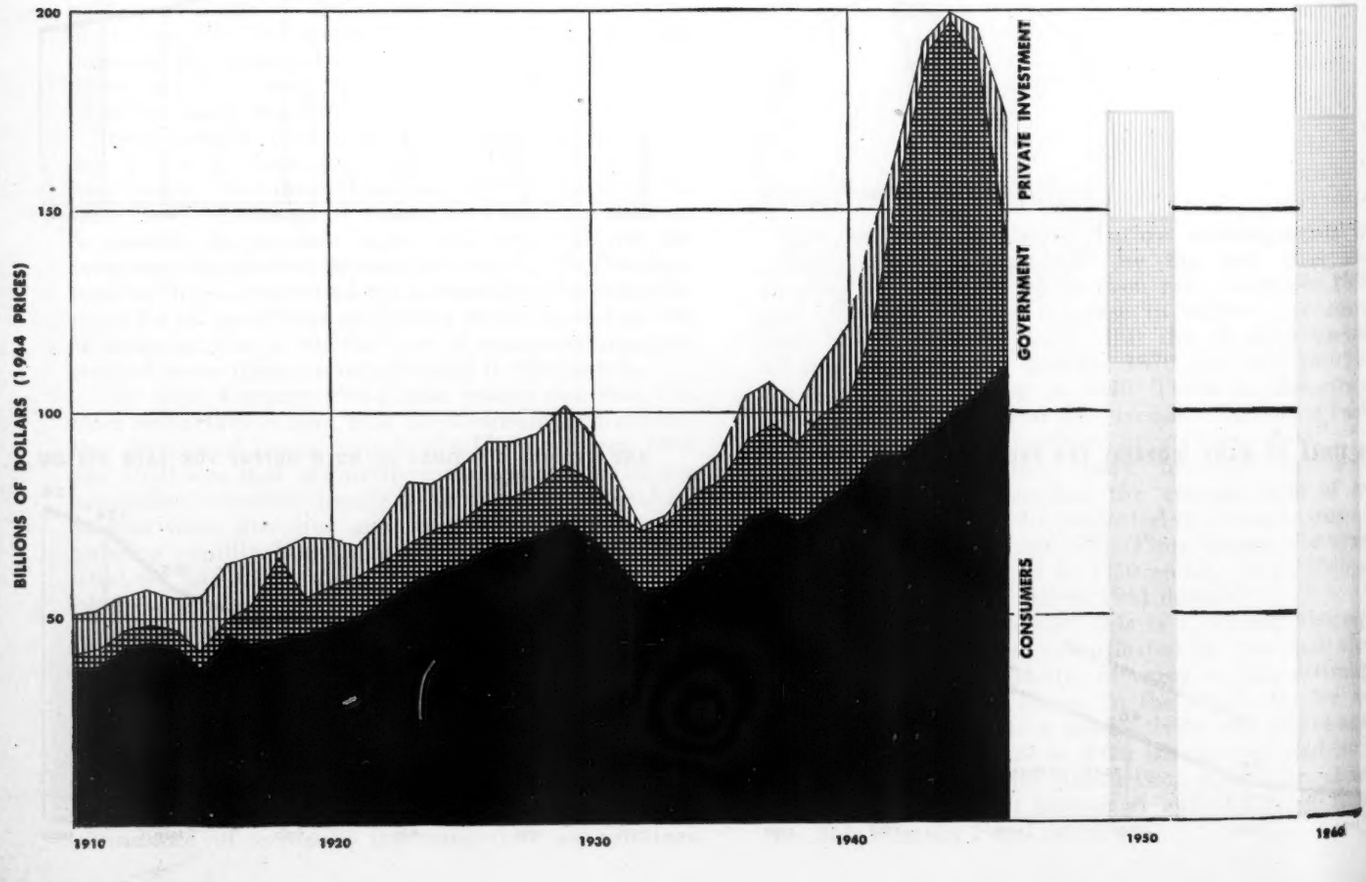
Gross national product measures the total market value of everything the nation produces. All the goods and services produced are absorbed in one of three ways: by consumer expenditures; by expenditures for investment in capital goods or inventories; or by government expenditures.

HIGHER TAXES, LESS INVESTMENT

The division of total output among consumers, investment, and government will be somewhat different in 1950 and 1960 than in the past. About two-thirds of total output will go into consumer goods and services. This is about the same as the proportion in prewar years.

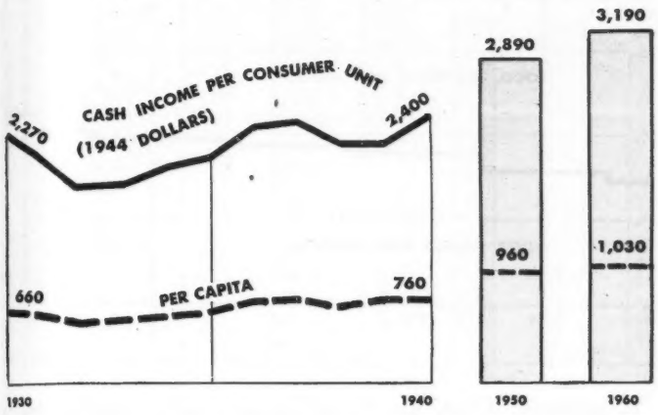
Government's share will continue to grow, however. It rose from 11% of total output in 1929 to 17% in 1940. At the peak of the war effort, half of all production went to Uncle Sam. Government expenditures have dropped to less than half the war peak and they will continue to decline slowly. But government's share will still run to around 20% in the 1950's. On the other hand, the ratio of investment to total output shows a slight long term decline.

HOW TOTAL OUTPUT IS DISTRIBUTED

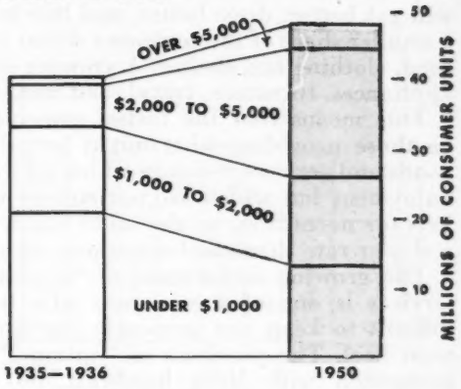


MORE CONSUMER PURCHASING POWER

CONSUMERS WILL BE ABLE TO BUY 50% MORE THAN IN 1930'S



EVERY OTHER FAMILY... INSTEAD OF EVERY SIXTH FAMILY... WILL HAVE $2,000 OR MORE TO SPEND.



CONSUMER INCOME

U. S. business can look forward to a 1950 consumer market twice as large as in the worst year of the depression, half again as large as in 1929, and one-fifth larger than in 1941. That is the major conclusion of the 20th Century Fund's analysis of consumer purchasing power. Here are the steps by which it arrives at that conclusion:

1. With gross national product at $177 billion in 1950, past experience indicates that income payments to individuals would run to $138 billion.
2. Income tax rates are assumed to equal the 1942 schedules, so individuals would pay $11 billion in taxes (as against $19 billion in 1946).
3. Savings are estimated at $12 billion, or about 9% of income after taxes.
4. Subtracting taxes and savings, consumer purchases of goods and services would total $116 billion.

LOWER SAVINGS

Many experts would criticize the assumption that savings will amount to only 9% of income. Some of them look for a ratio as high as 20% in prosperous postwar years. The 20th Century Fund justifies the use of a low figure on three grounds: (1) people built up reserve of savings during the war; (2) expanding social security will reduce the need to save for old age; and (3) taxes will cut into savings. The Fund's estimate of savings plus taxes in 1950 adds up to a higher percentage of income than in prosperous prewar years.

The standard of living won't rise as rapidly as the total income going to consumers, because the increased income will be split up among more family units. But the average consumer unit (a family or a single person living alone) will be a third better off in 1960 than in the 1930's.

Shifts in the distribution of income will be even more important, from a marketing standpoint, than the general increase in over-all consumer income. More consumer units will be in the over-$2000 brackets than ever before and this group will be receiving a much larger share of total consumer income.

Part of the apparent increase in income is cancelled out by higher prices. To show the actual increase in purchasing power, the figures should be adjusted for an estimated one-third increase in the 1950 price level over that of the mid-1930's. This would mean that a $2,650 income in 1950 would buy no more than a $2,000 income in 1935-36. Even if this adjustment is made, the resulting figures still show a striking upward shift.

Income Class	Consumer Units in Millions		Cash Income in Billions	
	1935-56	1950	1935-36	1950
Total	39.2	47.9	$85.0	$135.0
Under $1000	20.8	13.0	17.0	7.7
$1000-2000	12.2	12.9	28.1	21.5
$2000-5000	5.5	18.2	23.8	62.1
Over $5000	0.7	3.8	16.1	43.7

In addition to dollar income, shown in the above table, consumers also receive "income in kind"—food and fuel produced by farmers for their own use, board and lodging received by domestic servants. Such income will have a value estimated at $3.3 billion in 1950, most of which will supplement the $7.7 billion received by those in the "under $1000" bracket.

FOR CONSUMERS.

The urban market will continue to be far more important than the rural market. Consumer units in cities will receive cash incomes of $3,445 on the average in 1950, more than twice the farm average of $1,635 and almost twice the small town average of $1,880.

THE FARM MARKET

These figures don't provide an accurate measure of the relative importance of the rural and urban markets because rural consumers pay a lot less for food, fuel, shelter and so have more to spend for other things. If there were any way to adjust for these things, the figures would show a smaller spread between the two markets, but the urban market will still be dominant.

All these figures underline a general upgrading in consumer demands which would accompany high-level production and employment. It will have a profound effect on marketing practices. The average person will eat better, dress better, and live in a better house with better equipment. And he will have more money to spend for travel, recreation, and luxuries.

CONSUMER MARKETS

The improvement in living standards during the 1950 decade will lead to important changes in the way consumers spend their dollars. Even though they will eat better, dress better, and live in better houses, a smaller share of the consumer dollar will be spent on food, clothing and shelter. A growing share will go for appliances, furniture, travel, and recreation.

This means that the fastest growing markets will be those providing what might be called "optional" goods and services — things which add to comfort and enjoyment but which are not strictly necessary. Markets for necessities, on the other hand, will expand at a slower rate than total consumer expenditures.

The growing importance of "optional" goods and services is one of the reasons why it's increasingly difficult to keep our economic machine going on an even keel. The purchase of "optional" goods can be postponed with little hardship. So anything that causes people to put off buying a new car, a new house, or a new radio has a far greater effect on production and employment now than it did when the major share of the consumer dollar went for necessities.

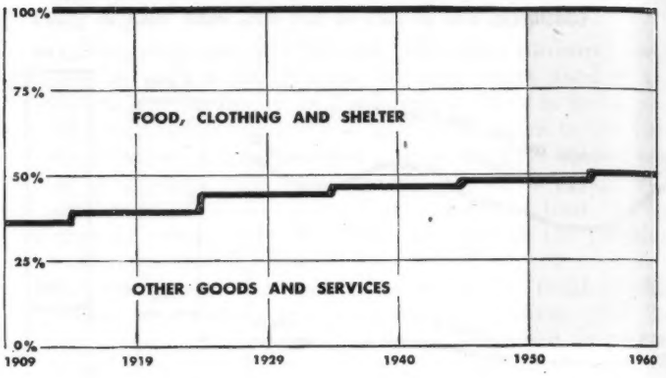
Some of the trends in major markets are summarized in the following sections.

FOOD

Although food is by far the largest item in the consumer budget, its relative importance is declining slowly as living standards rise. People eat the same number of pounds of food they ate in 1909 but the food is better from a nutritional standpoint and easier to prepare. Thus, the trend favors fruits, vegetables, and dairy products as against meat, potatoes, and bread.

More and more food is being processed in factories rather than in consumer kitchens. Improved methods of manufacture and distribution have transformed the luxury foods of yesterday into the standard foods of today. New kinds of processed foods — canned, frozen, and dehydrated — are appearing constantly.

STANDARD OF LIVING YARDSTICK: MORE OF THE CONSUMER DOLLAR GOES FOR THE COMFORTS OF MODERN LIFE



CLOTHING

Three long term trends will shape the clothing market in the future: (1) the shift from home and custom to factory fabrication is almost complete;

WHERE CONSUMER DOLLARS GO

(Figures in Billions of Dollars)

	1909	1919	1929	1940	1941	(1944 Prices) 1950	1960
Total Consumer Expenditures	28.8	60.8	80.3	70.6	80.4	116.2	134.2
Food, Liquor, and Tobacco	9.9	22.3	23.7	21.9	25.3	36.2	41.1
Food	7.4	18.8	19.9	16.4	19.0	27.2	30.8
Liquor and Tobacco	2.5	3.5	3.7	5.5	6.3	9.0	10.3
Clothing and Personal Care	4.4	9.8	12.1	9.8	11.5	16.2	18.7
Housing	6.8	10.1	14.4	12.6	13.3	19.3	21.4
Rent a.	5.5	7.9	11.3	9.1	9.7	14.0	15.4
Fuel	1.0	1.5	1.7	1.7	1.8	2.5	2.8
Electricity	0.1	0.3	0.6	0.9	1.0	1.6	1.8
Household Equipment and Operation	2.8	6.2	10.6	8.7	10.3	15.0	17.4
Appliances	0.2	0.4	0.8	1.0	1.3	1.8	2.4
Consumer Transportation	1.6	5.2	8.6	7.3	8.6	12.7	16.4
Autos and Private Planes b.	0.6	3.5	6.0	5.7	6.8	9.6	12.7
Local Bus and Street Car	—	—	0.8	0.7	0.8	1.5	1.5
Intercity Bus	—	—	0.1	0.1	0.2	0.2	0.2
Airlines	—	—	c.	c.	c.	0.1	0.5
Railroads	0.4	0.8	0.6	0.3	0.3	0.4	0.3
Medical Care, Insurance, and Death Expenses	1.1	2.8	4.5	4.7	5.2	7.7	8.7
Recreation	0.9	2.1	3.8	3.3	3.7	5.7	6.9
Radio and Television Sets	0.2	0.7	1.0	0.6	0.8	1.1	1.3
Private Education, Religion, and Welfare	1.2	2.2	2.7	2.3	2.4	3.4	3.7

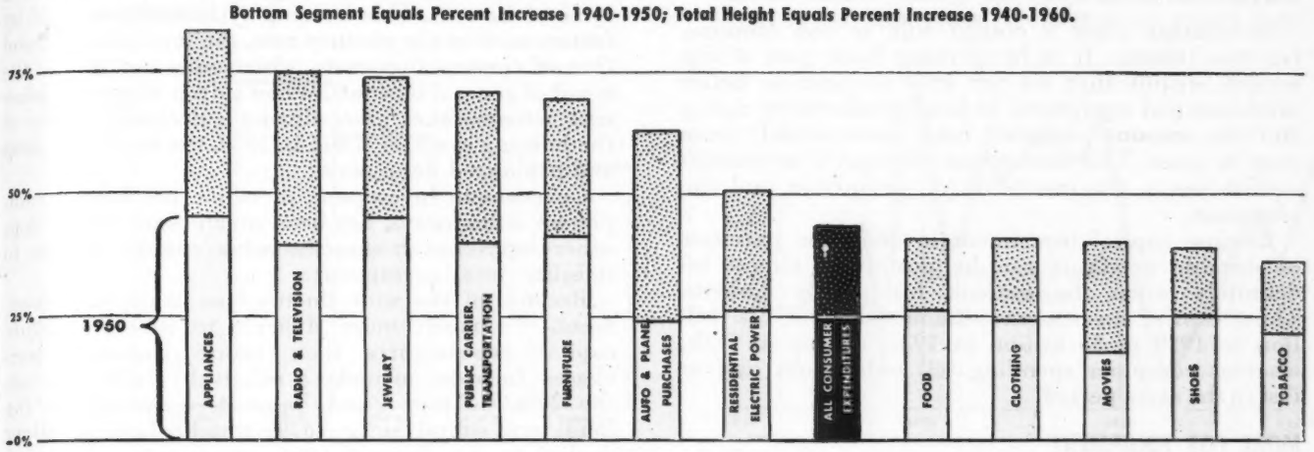
a. Includes Estimated Rent for Owner-Occupied Homes.

b. Includes Original Cost and Operating Expenses.

c. Less than $50 Million.

CONSUMER MARKETS IN 1950 AND 1960: Percent Increase in Sales Over 1940

Bottom Segment Equals Percent Increase 1940-1950; Total Height Equals Percent Increase 1940-1960.



(2) synthetics, chiefly rayon and nylon so far, are replacing cotton, wool, and silk at an accelerating pace; (3) there's greater standardization of styles and a trend to lighter and simpler clothing.

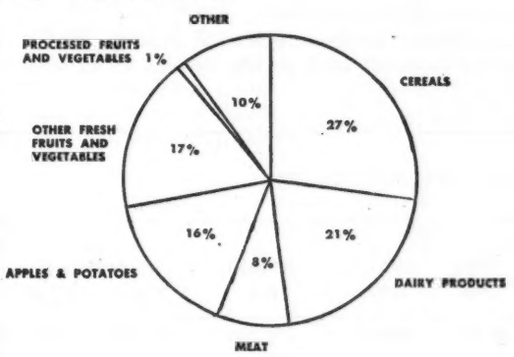
In 1909 consumers spent 14% of their income for clothing but by 1940 the ratio had reclined to 12%. However, this long run decline may be halted or reversed. The migration from farms to cities, the upgrading of incomes, and the growing demand for sports clothing will increase clothing expenditures.

HOUSING

The decline in the relative importance of housing expenditures — from 24% of consumer dollars in 1909 to less than 18% in 1940 — is expected to continue. The reason is that people feel they get more value for their dollars in other things than housing. Nevertheless, the housing market should be much larger in the 1950's than in the 1930's because much of our housing needs to be repaired or replaced.

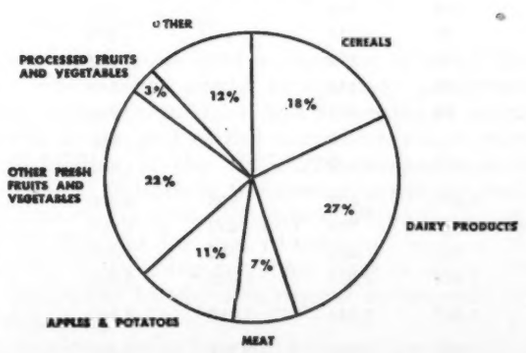
A Census survey in 1940 showed that 16 million of the nation's 37 million dwelling units needed to be replaced or needed major repairs. The 20th Century Fund estimates that the provision of adequate housing for everyone by 1960 would involve building 20 million new units and rehabilitating 5.4 million at a total cost of $115 billion (1944 prices). The Fund also estimates that we will fall 15% short of this goal even with continued high-level employment.

OUR CHANGING DIET: MORE MILK, FRUITS AND VEGETABLES LESS MEAT, POTATOES AND BREAD



1909

1880 POUNDS OF FOOD PER PERSON



1939

1882 POUNDS OF FOOD PER PERSON

HOUSEHOLD EQUIPMENT

More and more of the consumer dollar has gone for household equipment in the past four decades, largely because of the development of labor-saving appliances. The outlook is for a continuation of this trend. New appliances are being developed; and the large number of new houses slated to be built in the next few years, the wartime and postwar boom in the number of families, and the migration to the cities should add to appliance demand. The same factors should brighten the outlook for furniture, rugs, and other household items.

Some appliance markets may be saturated by the 1950's, however. A few years of high production would fill our homes with refrigerators, for example. However, replacement demand would run to 2.7 million units in 1960 and there would be a demand for 1.3 million refrigerators to equip new houses, so the market would still be bigger than in 1941 when 3.6 million were sold. However, new products must be developed if the industry is to keep up the pace it has set in the past.

TRAVEL

In 1916 the average person traveled 490 miles. By 1940 the average had grown to 2,400 miles, chiefly because of the rise of the automobile. The 20th Century Fund expects this growth to continue because as their incomes rise people spend more money traveling.

A good share of the increased spending will go to purchases of cars and planes. The Fund estimates that there will be 36 million cars on the road and 100,000 private planes in the air in 1950. The auto industry would be able to sell 5 million new cars a year after 1950 — 4 million for replacement and a million for population growth.

CAPITAL INVESTMENT

Investment plays a crucial role in our economy for two reasons. It is by plowing back part of our annual output that we are able to provide better machines and equipment to keep productivity rising. But the amount ploughed back varies widely from year to year. This unevenness of capital investment contributes to the instability of production and employment.

Because capital investment involves the purchase of durable goods, it can be postponed almost indefinitely when the outlook for profits darkens. Thus, capital investment plummeted from $18 billion in 1929 to $5 billion in 1933, a drop of 72%, whereas consumer spending fell only about half as fast in the same period.

MORE FOR EQUIPMENT

There has been an important shift in the relationship between construction and equipment, the two major types of investment. Before World War I, construction made up around three-fourths of total investment but the ratio declined to less than half in 1935-39. Part of the decline is, of course, explained by the fact that the depression left us with ample plant capacity but provided an incentive to buy more efficient machines to cut costs. Nevertheless, there is a well-defined trend towards allocating an increasing proportion of investment to equipment rather than to plant construction.

CAPITAL INVESTMENT . . .

A little less than two-thirds of total investment goes into industrial plants and equipment. Housing and other consumer construction (hospitals, schools, churches) averaged 27% of total investment during the interwar period. Housing fell from a peak of $6 billion in 1926 to $4.7 billion in 1929 and $600 million in 1933; and it had recovered only half the 1926 volume by 1940.

While other types of investment follow the ups and downs in general business, investment in housing construction follows a cycle of its own. This housing cycle is determined by factors such as the vacancy rate, the level of rents, and that of construction costs, which may not follow the trend of general business. When a drop in general business activity takes place during a declining phase of the housing cycle, as it did in 1929, the result is a deep and prolonged depression.

Government investment, of which the largest component is highways, has been much more stable than other types but it doesn't swing enough weight to stabilize total investment.

Because of the wide fluctuations in capital investment, it's much more difficult to estimate future capital expenditures than future consumer purchases. In order to make a relatively stable forecast, the 20th Century Fund bases its estimates on the long term trend since 1879, which shows a slight decline in the share of total output going to capital investment. Thus, investment under conditions of stable prosperity in the 1950 decade is estimated at 16% of total output as compared with a ratio of more than 18% in the late 1920's. On this basis, estimated capital expenditures work out to $28 billion for 1950 and $33 billion in 1960. Our ability to maintain high employment and rising living standards will depend in large measure on our ability to invest that much profitably in new machinery and buildings.

CAPITAL NEEDS

Analysis of our capital needs lends little support to the idea prevalent during the 1930's that we had reached economic maturity so that there was no way to invest as much as we had in earlier decades. No one has ever made an estimate of how much it would cost to modernize our industrial plant, which is valued at around $200 billion at prewar prices. If as much as a third of it needs to be replaced or rehabilitated, around $100 billion (current prices) of additional investment will be required.

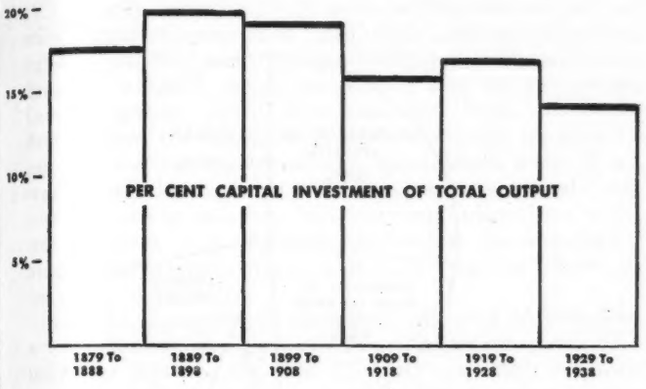
In addition, huge amounts of money need to be invested in housing and public works to raise the serv-

WHERE INVESTMENT DOLLARS GO

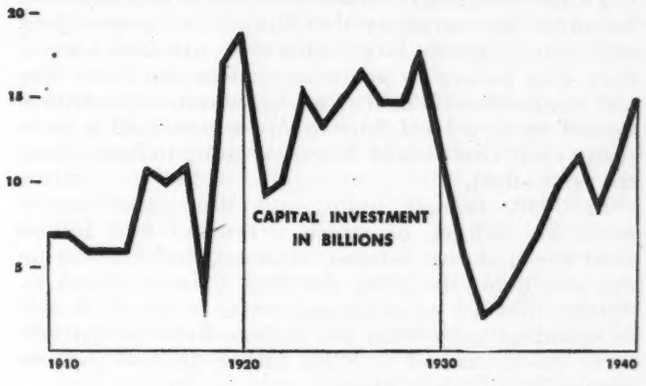
(Figures in Billions of Dollars)

	(Annual Averages)					(1944 Prices)	
	1920-1924	1925-1929	1930-1934	1935-1939	1940-1944	1950	1960
Total Capital Investment	$12,428	$17,186	$8,215	$10,445	$12,340	$27,700	$33,000
All Industries	7,570	10,112	5,272	6,889	8,089	17,800	21,125
Manufacturing	1,996	2,362	1,074	1,610	3,731	4,200	5,025
Food	261	357	194	244		228	273
Textiles	227	212	92	117		175	210
Steel	138	188	110	192		853	1,021
Autos	105	150	78	146		369	441
Chemicals & Petroleum	70	95	68	142		928	1,111
Machinery	—	—	—	28		180	216
Other	510	625	213	409		1,462	1,750
Transportation	1,797	2,303	1,277	1,822	805	4,300	5,100
Commercial	1,196	1,940	777	719	833	1,950	2,300
Utility	693	999	483	422	780	1,500	1,625
Other	1,888	2,508	1,661	2,316	1,940	3,950	4,700
Consumer Construction	3,806	5,557	1,547	2,256	2,912	7,200	8,255
Government Construction	1,052	1,517	1,396	1,299	1,338	2,700	3,620

OVER THE YEARS ABOUT 1/5 OF TOTAL OUTPUT IS PLOWED BACK AS INVESTMENT



BUT THE AMOUNT PLOUGHED BACK VARIES GREATLY FROM GOOD YEARS TO BAD, ACCENTUATING THE SWINGS OF THE BUSINESS CYCLE



ices provided merely to adequate levels. The 20th Century Fund estimates that the cost of a 15 year program to modernize our city streets and rural highways would run to $40 billion. To bring the nation's housing up to minimum standards of health and decency by 1960 would cost $115 billion. To conserve our natural resources and develop our water power would cost $27 billion over a 15 year period.

There seems to be little question that needs exist for all the capital investment we can make for a long time to come. The behavior of investment in the past strongly suggests that the problem is not one of lack of needs but one of finding ways to add to our capital in an orderly fashion. Capital investment has followed the boom and bust route in the past; what is wanted is a high but steady rate of investment.

WARTIME INVESTMENT DEFICIT

Demand for capital goods is stronger right now than ever before, largely because of the backed-up needs arising out of the war. Here is how wartime expenditures for capital goods which can be used in peacetime production compared with expenditures in the last 5 years of both the 1920's and 1930's: (Figures in billions of dollars)

	1925-1929	1935-1939*	1940-1944
Total Capital investment	$86	$65	$49
Industrial	51	43	32
Manufacturing	12	10	14
Metals, chemicals, machinery, petroleum	6	6	11
All Other	6	4	3
Commercial	10	5	3
Railroads	5	3	3
Electric power	5	3	3
Consumer Construction	28	14	12
Public Works	7	8	5

* Adjusted to Wartime Prices

Wartime restrictions held investment in all civilian lines far below what would be spent in prosperous peacetime years. Thus, there was a backlog of investment needs at the end of the war which ran to more than $30 billion, if the 1925-1929 demand can be taken as typical. Whatever the precise size of the backlog, it is clearly great enough, when added to the normal yearly demand for new investment, to keep the heavy goods boom going for some time to come. The test of our ability to stabilize capital investment will come later.

There is also a huge foreign demand for American capital. How far we will go toward meeting this depends largely on whether international political and economic conditions are stable enough to make private foreign investment a good risk.

If we invest abroad in the same proportion we did in the late-1920's, our foreign investments will total $1.6 billion during the year 1950 and $1.5 billion in the year 1960. This will mean a net increase in our foreign holdings of $15 billion during the 1950's, raising the total of such holdings to about $25 billion, as against a total of $10.6 billion in 1940.

To make that much foreign investment pay out, an expanding volume of world trade would be required. Foreign nations would have to get enough dollars not only to pay for goods they bought from us but also to pay interest and dividends on U. S. investments. If our overseas investments increase to $25 billion by 1960, annual interest and dividends owed us will run to almost $1¾ billion.

To pay us that much, foreign nations would have to sell much more in the U. S. than ever before. The 20th Century Fund calculates that imports of $7.3 billion in 1950 and $8.1 billion in 1960 would provide other countries with the dollars they need. Imports ran to $2.5 billion in 1940 so we would have to buy 3 times as much abroad to keep expanding our foreign investments.

With good business, U. S. demand for imported goods should be well above prewar. Rising living standards will widen the market for such consumer items as British tweeds and French perfumes. Moreover, we will need to import more raw materials than ever before because we used up our natural resources at a prodigious pace during the war.

NEW INDUSTRIES

The new methods, materials, and products developed during the war may well have a more profound and lasting effect on future capital requirements than the backed-up demands accumulated in wartime. Here are some of the wartime developments which may have important peacetime applications: new chemical processes and products including synthetic rubber, plastics, synthetic fibers and fabrics; new food products and new methods of food processing; new uses for glass, plywood, and the light metals; tremendous advances in aviation; and new applications of atomic energy and fissionable products in power production and medicine.

Large capital expenditures will be required to push these developments further and adapt them to civilian use. New businesses and perhaps entire new industries will grow up, adding to the demand for capital goods for many years.

THE COST OF GOVERNMENT

To the traditional certainty of death and taxes can be added the certainty that the cost of government will take a much larger share of national income than ever before in peacetime. After the Civil War and again after World War I, federal expenditures moved up to a level four times prewar. And it is already clear that World War II is going to have about the same effect.

In 1940, federal, state, and local governments spent $19 billion, of which a total of $2.2 billion went for national defense, veterans, and interest on the war debt. By 1950, the 20th Century Fund estimates that all governmental units in the U. S. will be spending more than $45 billion. Federal expenditures are estimated at $27.6 billion in that year as against $9 billion in 1940.

Part of the increase is explained by higher postwar prices. Adjusting for price changes would reduce the 1950 figure from $45 billion to $33.5 billion. This is still 80% above the 1940 level. Increased expenditures for public works, social insurance, and schools explain another small part of the rise.

But costs arising out of the war are by far the most important factor. Military and veterans' expenditures and interest on the war-swollen national debt will add up to over $17 billion in 1950. This is only 10% less than total government expenditures in 1940.

The only major category of government expense which would be lower in 1950 is welfare. With high-level employment and more social insurance, relief and other welfare costs should run to $2.5 billion in 1950 as against $3 billion in 1941.

The following paragraphs describe important trends in the major items of government expense.

MILITARY

The 20th Century Fund assumes that we will maintain an armed strength of 2 million men (including trainees) and that it will cost $3,300 to equip and maintain each man, so total military expenditures will run to $6.6 billion. But even if we decide to maintain a smaller armed strength, the total cost might easily be at least $6.6 billion because the present per serviceman cost of over $6,000 a year may not decline.

AND GOVERNMENT . . .

VETERANS

It will cost at least $2.9 billion to take care of veterans in 1950 even if benefits are not increased. That's 5 times the 1941 cost. Pensions for World War I veterans rose steadily from $116 million in 1924 to over $300 million in 1945. That rise will continue for another 20 years. By far the largest expense will be for World War II pensions which are already costing $900 million. Disability and death benefits will cost about $1¾ billion in 1950; hospitalization will add another $250 million; and insurance $150 million.

SOCIAL SECURITY

Future expenditures for social security will depend on whether steps are taken to extend coverage and liberalize benefits. Over 60 million people are now covered so the cost is certain to increase rapidly as more of them begin to draw payments. With high-level employment in 1950, estimated old age and unemployment benefits under the present system would run to over $5 billion. Expansion of benefits, as recommended by the Social Security Board, would raise the cost to over $9 billion.

WHY THE COST OF GOVERNMENT HAS INCREASED. The $25.6 billion increase in cost from 1913 to 1941 was due to:

PUBLIC WORKS

Even an economy-minded Congress is almost certain to go along with expenditures for highways, airports, waterways, flood control and conservation. Thus, an increase in expenditures for transportation and natural resources from less than $2.5 billion to over $5 billion in 1950 seems probable.

SCHOOLS

Education ranks third among all government expenditures. In 1941 we spent almost $2.5 billion—10% of all government dollars—on schools. Teachers' salaries account for almost three-quarters of the total cost so the trend towards higher salaries will boost the nation's bill for education.

WHERE TAX DOLLARS GO

(Figures in Billions of Dollars)

	1913	1932	1941	1950 (1944 Prices)	1960 (1944 Prices)
All Government Expenditures	2.5	12.4	23.1	45.5	50.7
Federal	0.7	4.3	12.9	27.6	28.6
State	0.2	1.8	3.6	7.0	9.3
Local	1.6	6.3	6.6	10.9	12.8
Military	0.27	0.7	6.1	6.6	6.6
Veterans	0.18	0.8	0.6	2.9	3.2
Interest	0.15	1.3	1.7	7.9	8.1
Social Insurance	—	0.2	1.9	7.7	8.7
Welfare & Health	0.31	1.5	4.1	4.0	4.1
Education	0.65	2.5	2.7	3.7	4.3
Public Works	a.	a.	a.	5.6	7.1
Transportation	0.40	1.9	2.0	1.8	2.7
Natural Resources	0.03	0.6	1.4	1.2	1.1
Police & Fire	0.19	0.7	0.7	1.0	1.1
Other	0.40	2.4	2.0	3.0	3.6

a. Included in other groups.

NATURAL RESOURCES

The war left the U. S. with a depleted supply of most natural resources, and with critical shortages of some of the most essential minerals. Nevertheless, lack of natural resources should not be a limiting factor on our productive capacity. With relatively free access to world markets, we should be able to get all the raw materials we need. And, even if we were denied access to world markets, we could use our low-grade reserves and develop substitutes without causing a prohibitive reduction in our living standards, though everyone would feel the effects in one way or another.

The U. S. economy consumes about a billion and a half tons of raw materials each year, or about 11.5 tons per person. Of this 3.5 tons are coal, 1.5 tons are petroleum, and iron and copper ore each contribute about a half a ton. In 1939 the value of unrefined minerals output was $4.2 billion and 2% of all workers were engaged in mining or lumbering.

FUTURE REQUIREMENTS

The level of industrial production projected by the 20th Century Fund would raise minerals requirements a third above 1940 by the year 1950 and 50% above 1940 a decade later. Here is how natural resources requirements in the 1950 decade would compare with 1940 and the wartime peak: (Index numbers, 1940 equals 100)

	Wartime Peak	*1950*	*1960*
All minerals	138	133	151
Metals	157	117	126
Fuels	130	141	164
Other	141	128	142
Lumber	126	93	76
Electric Power	159	173	224
Manufactured Gas	120	94	75

The capacity of our supplies of natural resources to support future levels of output cannot be determined with any great accuracy. It will depend on the size of our reserves and on our ability to use supplies more economically and develop substitutes.

WITH THE RESOURCES AVAILABLE . . .

Because there is no way to measure these factors with any degree of precision, all estimates of the number of year's supply are subject to wide errors. However, such estimates are useful in directing attention at those resources where every effort should be exerted to develop new supplies, substitutes, and more economical methods of use.

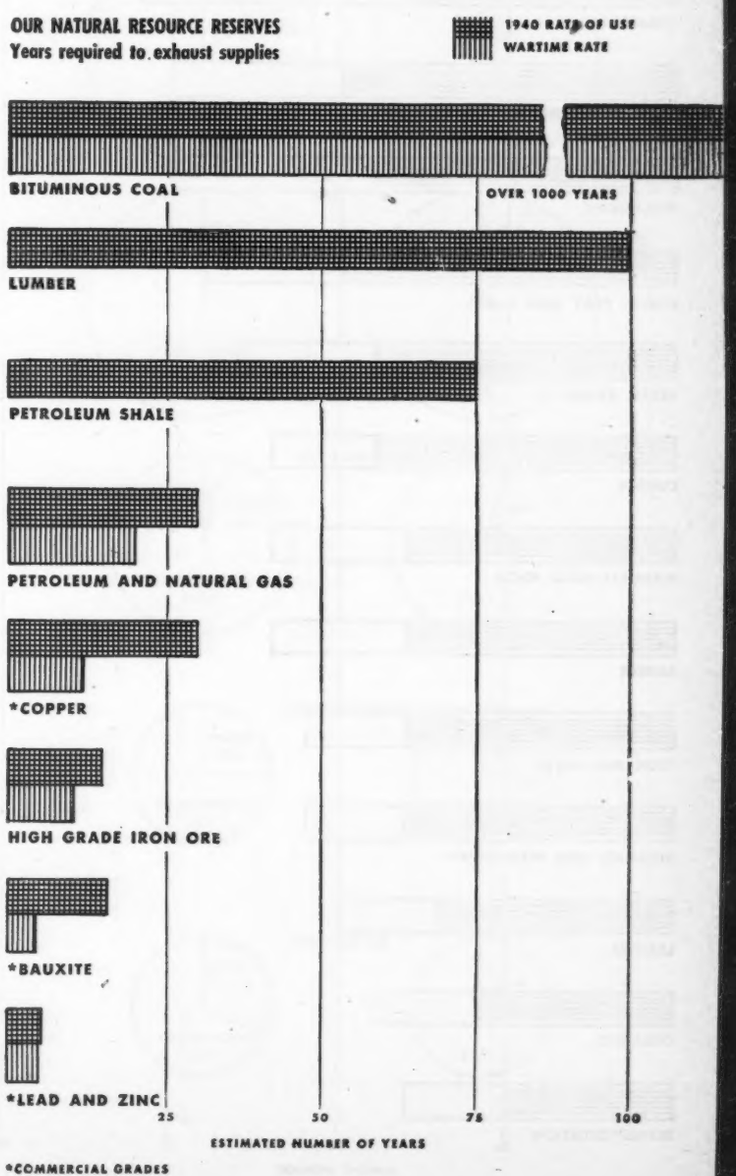
BIGGEST PROBLEMS: LEAD AND ZINC

Commercial grades of zinc, lead, and bauxite will be exhausted before 1960 even if the rate of use is cut to half the wartime rate. Supplies of petroleum and natural gas — which furnish 40% of our energy — will last longer than 20 years but their partial depletion will raise many technical and economic problems long before that time. Possible exhaustion of high-grade deposits of such minerals as iron and copper in the foreseeable future will stimulate development of processes to use low-grade deposits.

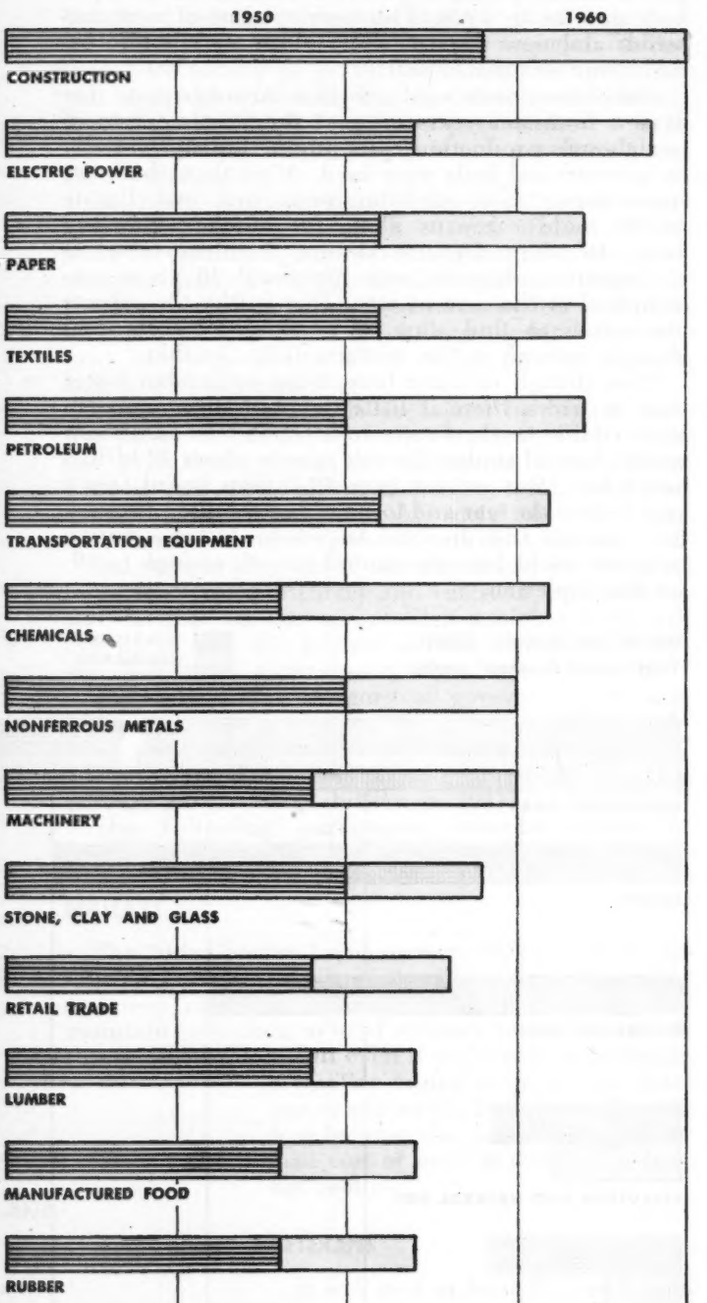
We have been discovering more and more ways to stretch our supplies of natural resources, however. In the case of tin, the electroplating process saves 50% of the tin used in tinplate production. The electric power industry uses less than 40% as much coal per kwh now as in 1920. The development of new materials and new ways of using old materials also expands our resource capacity.

Our bituminous coal reserves are adequate for over a thousand years even at the wartime rate of use, though production costs might rise substantially as inferior coal beds were used. After that, there are huge deposits of sub-bituminous coal and lignite which could carry us along for another thousand years. In comparison, maximum petroleum reserves are minute, adequate only for about 30 years consumption at the current rate. That is why the experts are trying to find ways to produce oil from coal cheaply enough to be commercially feasible.

Even though we have been using up lumber faster than it grows, there is little doubt that enough will be available in the future to meet at least minimum needs. Annual timber growth runs to about 32 billion board feet. But we cut over 40 billion board feet a year before the war and lost another 6 billion through fire, insects, and disease. An adequate conservation program could increase annual growth enough to offset this depletion.



PRODUCTION PROSPECTS: Estimated Percentage Increase in Industrial Activity Over 1940



INDUSTRIAL CAPACITY

At the end of World War II U. S. industry found itself with surplus capacity in some lines and serious deficiencies in others. There was more than enough aircraft, machine tool, and synthetic rubber capacity but not nearly enough sheet steel, copper, or electrical machinery capacity to meet pent-up demands.

War experience showed, however, that industrial capacity can be expanded enormously in a few years, given the need and the funds. Thus lack of industrial capacity should not prove a bottleneck to meeting the demands of consumers in the 1950 decade.

A rough estimate places our total investment in industrial facilities (manufacturing, mining, transportation, and distribution) at $200 billion. Just how much capacity industry as a whole, or any given industry, has is impossible to measure.

Capacity is a most elusive concept. In a technical sense, the capacity of an industry is the combined production of all its plants working 24 hours a day, 365 days a year, less an allowance for repairs, breakdowns, and other technical factors. Actual capacity is far less, however. Some facilities are obsolete or high-cost. Supplies of raw materials and components may be insufficient to keep assembly plants running full-steam. Moreover, demand for many products isn't great enough to support round-the-clock production.

PLENTY OF CAPACITY

During the past quarter century, however, experience shows that we have had more than enough overall capacity, and more than enough capacity in almost every industry, to meet all demands. An extensive study showed that even in 1929 only the steel and machine tool industries were definitely operating at capacity.

The growth of productivity as old machines are replaced with new and more efficient ones and as new techniques are developed is one of the main reasons why industrial capacity more than keeps pace with markets. The depression of the 1930's led to a net retirement of about 5% of total manufacturing facilities but manufacturing plants in 1939 could have turned out a quarter more than in 1929 because productivity was a third higher.

Whenever an industry's output begins to approach technical capacity, it becomes profitable to purchase new and more efficient equipment to replace or supplement existing machines so that a certain amount of excess capacity seems to be inevitable in a free enterprise system.

Estimates of the level of industrial production in different lines under conditions of high-level employment during the 1950 decade are shown in the chart. They assume that past trends will continue so that they give only a rough idea of what would happen to output in each industry. Unpredictable shifts of consumer demand or new product developments might cause a big change in the pattern of industrial production. Such estimates are, nevertheless, useful in that they provide a clue to lines where the largest increases may take place.

None of the projected increases are so large as to tax our ability to provide enough capacity. This is not to say that there will be no bottlenecks because of lack of capacity for certain components, for instance. However, we should be able to make good in short order any deficiencies of that sort that may develop.

DEMANDS VERSUS NEEDS

Despite the substantial increase in living standards which would be possible with high-level production and employment in the 1950 decade, many U. S. consumers will be unable to buy enough of life's necessities to maintain themselves at a health and decency level. Almost 30% of all families would receive less than $1,000 a year cash income and one-third of this group would receive less than $500.

The 20th Century Fund asked a series of experts to estimate the quantities of food, clothing, housing, medical care, and other things needed to provide a standard of living at a minimum health and decency level. The experts also figured out how much it would cost to bring everyone expected to be below that standard in 1950 and 1960 up to the calculated level. In other words, the estimates show the cost of establishing a "floor" for consumption without disturbing the spending patterns of those who received more than enough income to satisfy the calculated minimum needs.

ESTIMATES OF NEEDS

Any estimate of "needs" must rest upon someone's opinion as to what constitutes "health and decency" in this day and age. In the case of food, the nutritional requirements of a minimum health and decency standard can be determined accurately. In other fields, such as housing and education, even the experts would disagree over what constitutes a minimum standard.

However, what is important is not the precise size of the estimates but their general magnitudes. The conclusion that we would have to spend about 50% more on medical care than we are likely to in 1950 is important even if the experts' appraisals of the deficit range from as high as 60% to as low as 40%.

To fill total needs calculated in this manner would require production of $200 billion of goods and services in 1950 or 13% more than the $177 billion which would be turned out with high-level production and employment. In 1960, estimated production would fall short of needs by 8%. Food accounts for the biggest share of the deficit but needs outrun demand by important margins in housing, medical care, education, and social security.

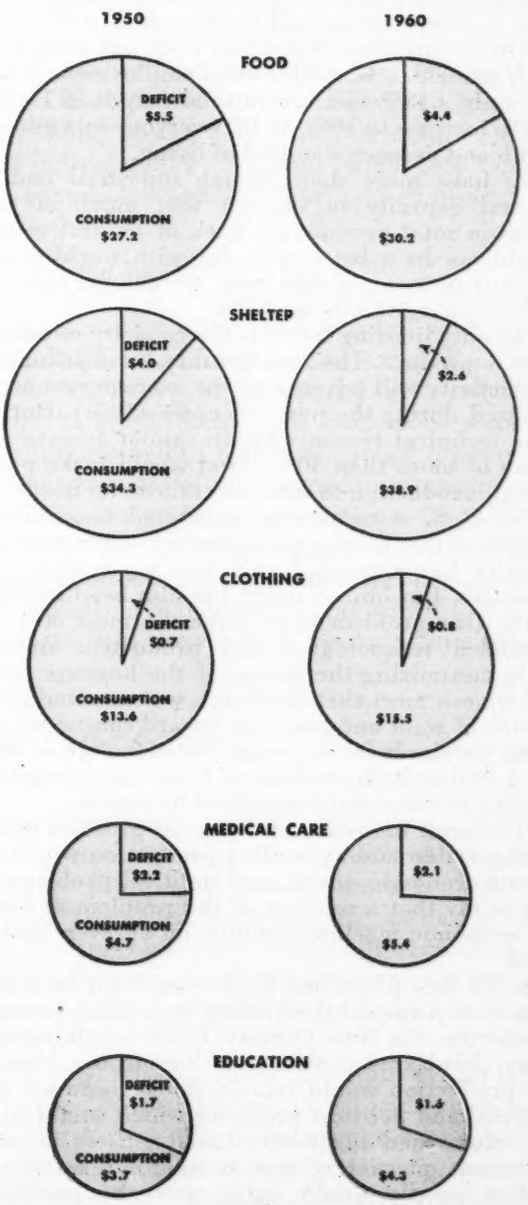
TO MEET ALMOST ALL OUR NEEDS

To provide nutritionally adequate moderate-cost meals for those unable to afford them would add $5.5 billion to the $27.2 billion that would actually be spent on food in 1950. This assumes no change in diets of those with adequate incomes despite the fact that many people in those groups do not eat what they should. If we all ate what we needed, we would consume twice as many fresh vegetables as in 1940, half again as much milk, more fruits and tomatoes; and we would eat smaller quantities of sugar, sirups, fats, and oils. This better diet would cost us less than we will actually spend for food in 1950.

So large a portion of our existing housing is unsatisfactory by any reasonable standards that it would take 10-15 years to provide everyone with adequate housing. One of the reasons why we don't have adequate housing is that many consumers cannot afford to pay enough rent to finance it. Estimated expenditures in 1950 for rent (including the estimated rental value of owner-occupied homes) would run to $14 billion as against an estimated need of $16.4 billion.

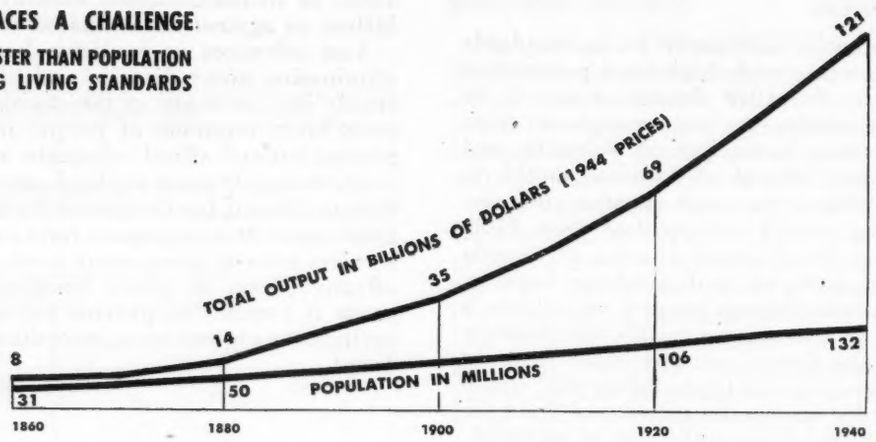
Vast advances in medicine have gone far toward eliminating many diseases and have brought about a steady improvement in the standard of health. However, large numbers of people in the lower income groups cannot afford adequate medical care. Moreover, to supply good medical care for everyone under the traditional fee-for-service basis would cost several times more than consumers have ever spent for medical services even in prosperous years. Development of an effective form of group medicine, however, would make it possible to provide adequate care at a great saving over present costs, according to the 20th Century Fund.

HOW CONSUMPTION WOULD COMPARE WITH TOTAL NEEDS
(Figures in billions of dollars)



THE U. S. ECONOMY FACES A CHALLENGE

PRODUCTION HAS GROWN FASTER THAN POPULATION GIVING PROMISE OF RISING LIVING STANDARDS



The major conclusion of the 20th Century Fund's survey of America's needs and resources is that we have reached a point where we can provide everyone with a decent living and most people with a living which, by any standards other than our own, is positively luxurious. With high-level employment, it would take only a 13% increase in total output in 1950, and an 8% increase in 1960, to lift everyone to a minimum health and decency standard of living.

We have more than enough industrial and agricultural capacity to support that much of an increase in total production. Lack of natural resources should not be a bottleneck, for with world trade on any sort of a reasonable basis we will be able to get all the raw materials we need.

The only limiting factor is the capacity of our labor force to produce. The 20th Century Fund assumes that productivity will advance at the average rate actually achieved during the past 9 decades (18%). But there is no technical reason why we cannot achieve an increase of more than 30%. That would make possible enough production to meet our minimum needs.

The U. S. economy has exhibited two dominant characteristics in the past century. Our productive capacity has expanded at a rate never approached elsewhere. But our economy has also been highly unstable. Our problem is to make the most of our unparalleled technological and productive know-how while minimizing the swings of the business cycle.

If we can meet that challenge, we can eliminate the specter of want and move on toward constantly rising living standards for everyone. Never before in history has a nation been so close to abolishing poverty and meeting the material demands of its citizens.

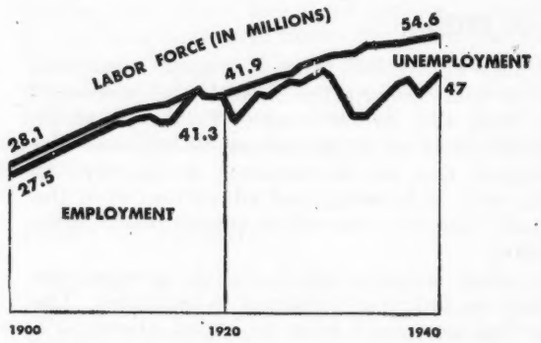
This is not to say that solving the problem of maintaining stable and expanding production would solve all our economic, social, and political problems. Nor is it to say that a solution of the problem of keeping our economic machine running on an even keel is at hand.

In the first place, the U. S. would not be a utopia even if we achieved the kind of high employment and production the 20th Century Fund is talking about. Many perplexing problems of how to best distribute our production would remain. Then there are a host of social and political problems which would still tax our efforts and ingenuity. Finally, there is the all-important question of how to maintain world peace.

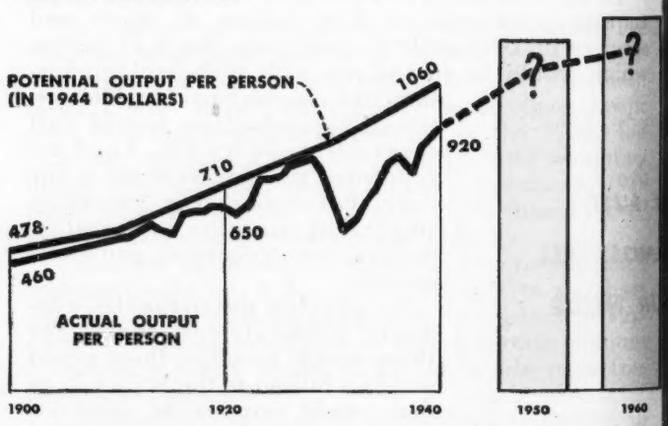
Most people would agree that the problem of maintaining high employment and rising living standards is still far from solution. Our ability to mobilize and direct our economic resources so as to keep our economy running on an even keel has lagged behind our ability to solve technical production problems. Each businessman, each worker, and each consumer must somehow learn to act differently in many ways than he has in the past if we are to solve our number one economic problem.

Just what changes in our economic life will be necessary no one knows. On our ability to find out these things and put them into practice in the next few years depends our success in meeting the challenge which the 20th Century Fund's study underlines. That challenge is that we have within our grasp the ability to eliminate actual want from the U. S. and to provide more and more things for better living for everyone.

BUT THE GROWTH HAS FOLLOWED THE BOOM AND BUST ROUTE INVOLVING LONG PERIODS OF MASS UNEMPLOYMENT



CAN THE ECONOMY PROVIDE STEADY EMPLOYMENT AND RISING LIVING STANDARDS?



Reprints of this report are available at a charge of 25¢ each to cover the cost of handling and mailing. Address orders to Department of Economics, McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York 18, N. Y.

ENGINEERING AND MINING JOURNAL

May 1947

Good Labor Relations Is a Permanent Job

ALTHOUGH IT APPEARS that legislation now pending will tend to equalize the legal rights of employers and employees, farsighted management will not relax efforts to establish closer relationships with employees.

At this writing, the House has already passed a bill that goes a long way to deprive labor leaders and organizations of special privileges. The Senate is preparing to pass one nearly as drastic. The area of doubt concerns the possibility of a Presidential veto and how severe a bill, if any, Congress will pass over a veto, should it occur.

The changed attitude of Congress toward a group before which it has cowered for more than ten years is a measure of how fed up the public and many union members are with the arrogant conduct of most labor leaders and the tactics of Communists who use the labor movement as a foil for subversive activity. Obviously, Congress has been hearing from the home folks in a convincing way when it can screw up enough courage to defy the votes which labor organizations can muster. In fact, one can only conclude that a large percentage of union members no longer heed their leaders' urging in casting their votes.

Nevertheless, despite all this evidence that things are coming his way, the employer who simply relaxes on the job of improving the cordiality between management and workers and of increasing the employees' understanding of the economics of the enterprise has learned little from his bitter experience under the tyranny of the New Deal. Those who went through it ought never to forget the opportunity that a broad gulf of indifference and misunderstanding between employers and workers gave to political exploitation and destructive leadership.

In short, the employer who can profit by experience has learned that under any conditions it is good sense to cultivate the self-respect of workers, to regard them as partners in the enterprise, to keep them interested and informed with honest facts, and to grant them their reasonable share of gross income before being put under pressure to do so. Regardless of what new labor laws may be passed, we are going to have unions. The only real protection for employers against destructive union leadership is a working force that is getting a square deal from management and is aware of it, and takes pride in the worth of its own functions.

Russell Bill Should Be Tightened

THE RUSSELL BILL (H.R. 2455), providing for permanent extension of the Premium Price Plan and discretionary authority to include all strategic and critical minerals, in the form that emerged from the House subcommittee which held hearings on it, has important defects.

A considerable number of people in the mining industry have very serious objections to any direct subsidies to domestic mineral producers. Their misgivings are based on the fear that the Government control implicit in subsidy dispensation will end up in nationalization of the mines; also that any industry in which cost-plus is substituted for competition is headed for trouble. The people who hold these views are not exclusively large operators, low-cost producers, or confined to any section of the country. It is unfortunate that they should be disregarded as completely as has been done in the subcommittee version of H.R. 2455, which virtually gives an administrator an $80,000,000 blank check every year to spend at his discretion.

For our part, we have been in a state of mental conflict over the problem of direct subsidies to marginal producers. We acknowledge realism in the fears mentioned above, and share the almost universal distaste of mining men for Government encroachment. In contrast to the general attitude

of subsidy opponents, over the long pull we fear the weakening effect of a cost-plus economy even more than a drift toward nationalism.

Nevertheless, considering the importance and irreplaceability of mineral resources, we decided some time ago that in cases where abandonment of operations probably means condemnation of the remaining resources, it would be in the public interest for Government to step in and prevent such a waste, placing the products on a national stockpile.

As to a more general policy of direct subsidies, in view of the dangers set forth above we have not been able to develop a settled opinion, despite our sympathy for those operators whose costs have been so jacked up as a result of the war that they view subsidies as essential for their survival. Apart from this sympathy, we have striven to be openminded toward subsidies because of doubts that an import tariff will provide all the protection in the future that domestic mining, in the public interest, ought to have. Most people who follow the subject of mineral tariffs believe that tariff protection will continue a downward trend or, at least, not be increased. Even considering the shift from Democratic to Republican control, this viewpoint is given background by the circumstances that the United States is struggling to maintain a world of multilateral trade freedom against totalitarian forces that prefer barter, quotas, and exchange restrictions. In this situation, this country can hardly initiate tariff increases without causing other nations to repudiate its proposals.

Thus, we are tolerant toward direct subsidy proposals until the future is clearer, but believe that all possible precautions should be taken to forestall their becoming a tool for Government control of mining and to prevent a cost-plus debauch.

Also, it hardly makes sense to ask for money from hard-pressed taxpayers in the name of conservation and then to throw the returns from their expenditures into the market.

Thus, we suggest that the Russell bill should be modified to require the maintenance of efficient operations as one of the qualifications for receiving subsidies and that other restraints should be placed upon the discretion permitted the administrative agency in order to curb any tendency toward unnecessary Government encroachment or the starting up of a "gravy train" for political ends. To satisfy those who consider the conservation angle, the market-value equivalent of the Government's expenditures should be stockpiled.

Gadgetry In Milling

IN DISCUSSION in a session on Milling Methods during the recent meeting of the A.I.M.E., several speakers made the points that automatic control of milling operations could be carried too far, out of sheer enthusiasm for gadgets as such. Also, that through long dependence on instruments operators might lose the ability to control their own mills.

That there is some danger on both counts, we agree. But our observations in mills run by alert progressive managements lead us to have faith that neither of the foregoing evils will materialize.

First, no gadget that is not fulfilling a real use in a mill can long survive. Conversely, if an operation can be done better by a gadget than a man, the gadget will do it.

Second, if mill operators become so dependent on instruments that they are lost if the instrument fails, the problem is clearly one of training them to meet such emergencies.

On neither count is there anything to fear, and we hope millmen will keep right on trying out gadgets. If they ever stop trying, then, indeed, will we have cause for worry.

Tungsten Carbide a Curb for Diamond Prices

IF LAST YEAR'S ADVANCE in prices of industrial diamonds tended to make a mine operator long for a substitute drilling medium, whether for blast-hole work or exploration purposes, the current reports of the remarkable drilling performance of tungsten-carbide bits could easily make him think that the substitute had been found. These bits, in two- and four-point types for percussion air drills and in rotary types for "diamond" drills, are to be regarded as in competition with diamond-set bits in both blast-hole and exploration drilling. It would seem that those responsible for the advance in diamond prices had overlooked the new competitor. Even though, when translated into terms of increased cost per ton broken, the price rise cited has not proved important in most instances of blast-hole diamond drilling, it surely enhances the attractiveness of tungsten carbide.

In the mining industry the advent of carbide bits provides a new competitor for the diamond bit that may conceivably exercise a corrective influence on the market for industrial stones.

Cooperative Education Is Practicable

THE PRACTICAL BENEFITS that have been achieved by college courses in which the student spends a portion of his curriculum in industrial employment warrant the attention of mining schools and the industry. These results fully justify the offering of such cooperative education to students training to enter mining. As indicated in the paper by Professor Behre of Columbia before the recent AIME session on "Training the Geologist for a Career in the Mineral Industry," some mining educators already realize this.

Cooperative education offers many advantages. The student gets an early opportunity to know what work in mining is like. If he finds it not to his liking, he has the opportunity to switch his curriculum before he enters into specialized study; also, the industry is saved having to deal with a misfit and the school the expense of wasting its specialized facilities. At the time of graduation the student has useful contacts and experience, and should have his "muck stick" days behind him. He should have enough seasoning to seek employment in a spot suited to his inclinations, without having to knock around for several years getting located. The employer gets a look at a number of candidates, and a chance to establish contact for future employment with those who please him best. The student should be better off economically, even considering the longer time necessary to obtain a diploma by the cooperative route.

An outstanding benefit is the avoidance of the lackadaisical attitude which many students in ordinary curricula have toward most of the courses taken, simply because they do not appreciate the practical value of the subjects. After a sojourn in industrial employment, the student will not only perceive where the various subjects offered in school fit in, but the whole educational experience will be more real and interesting. We think it is not visionary to anticipate that students engaged in cooperative education will "dig in" and get twice as much out of their scholastic work.

In our opinion, cooperative education in mining or geology calls for longer work periods than similar training for industries located just around the corner from the college. The travel expense involved in switching back and forth between school and industry makes this desirable. Also, whereas in some currently established cooperative study, the student spends all his industrial time in the employ of a single firm, we believe that the diversity of mining calls for requiring the student to pass each industrial experience with a different employer. The broadening result of different experiences will far outweigh whatever advantages there may be in having repeated contact with a single employer.

The poor starts which most high schools are now giving their products require colleges to spend some time on rounding out preparatory training. This handicap, plus broad pressure for the introduction of more nontechnical subjects into mining curricula, suggests that time spent in college should be lengthened. To meet these needs, we offer the following outline of a proposed six-year cooperative course including 40½ months in school: first year, two school semesters; summer and following semester in industry; then two semesters in school with an intervening vacation; the second semester of the third year and the following summer are occupied by the second industrial experience; the fourth school year and the first semester of the fifth, except for an intervening vacation, are spent in school; the second semester and the following summer are passed in industry; the sixth year is in school.

This curriculum, except for one semester, gives a balanced load on a faculty.

To those schools which are unwilling to go to a six-year curriculum or would prefer to make a trial on a five-year basis as an intermediate step, we suggest the following five-year cooperative plan, which gives a well-balanced load on a faculty and eight semesters of schooling:

The first and second years, except for a summer vacation, are in school; the following summer and the first semester of the third year are passed in industry; the next two semesters, save for the vacation, are in school; the second semester of the fourth year and the following summer are spent in industry; the first year is in school.

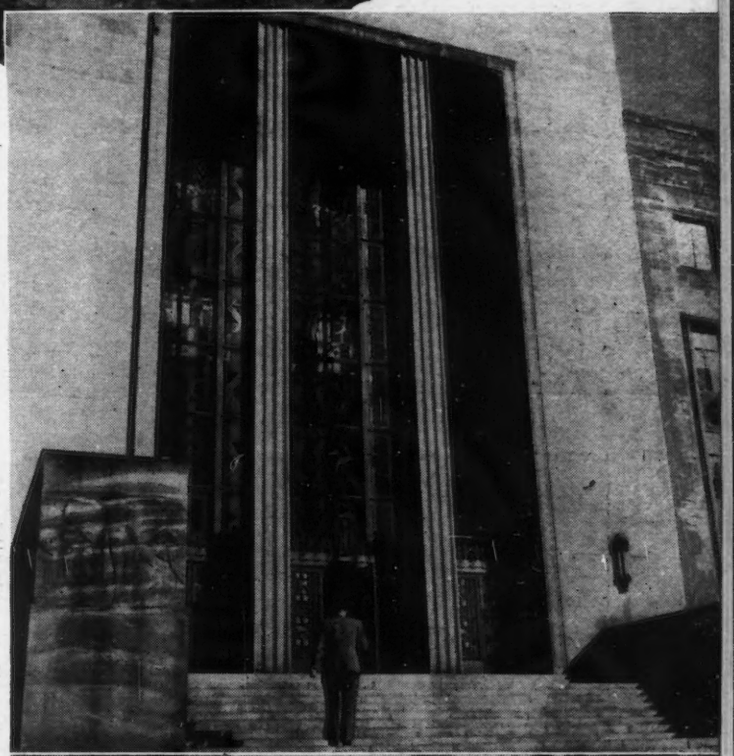
Possibly some of the additional work sought in many quarters could be added to this shorter curriculum by requiring the student to do some extension work during the two industrial periods.

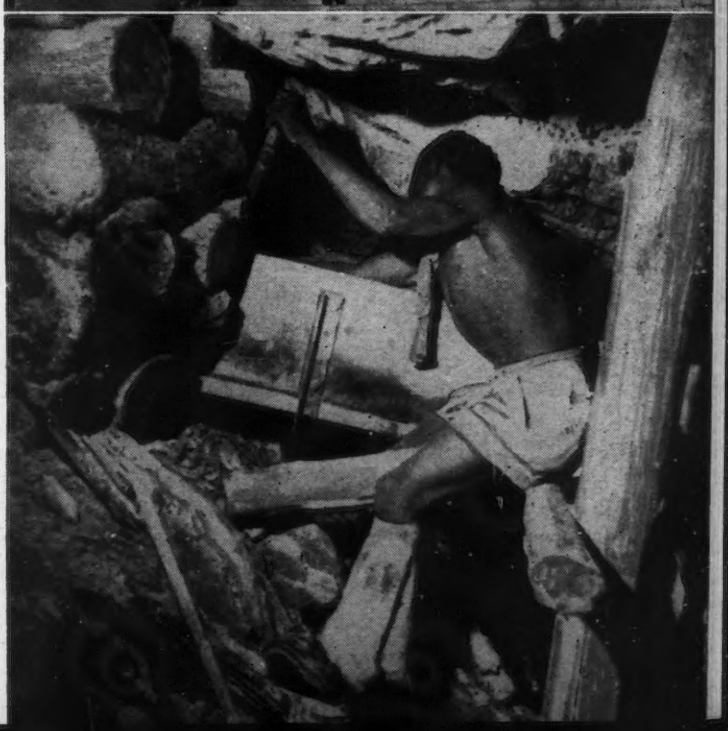
In our opinion, the schools which undertake to offer cooperative education will find an adequate response from the mining industry. The closer bond will be beneficial to both sides and contribute toward more practical education and a greater interest in education on the part of the industry.

HISTORICAL SUMMARY: ENGINEERING AND MINING JOURNAL was founded in 1866 as the American Journal of Mining, the title being changed in 1869. The following publications have been consolidated with Engineering and Mining Journal: Coal and Iron Record (1875); The Mining Review (1877); The Polytechnic Review (1879); Mining and Metallurgy (1902); The Mining Magazine (1906); Mining and Engineering World (1917); Mining and Scientific Press (1922); Engineering and Mining World (1932). All rights to foregoing titles of consolidated publications are reserved by the publisher.

Photographs by Jorgensen from Three Lions

KAFFIR GOLD





WORLD CAPITAL of gold mining is Johannesburg, Union of South Africa, whose tall modern buildings (left) rise against a backdrop of tailing piles, residue of the billion and a half tons of ore mined over the past 60 years. Though the 45 active mines of the district, called the Rand, ship more than 400 tons of gold yearly, and last year paid dividends of over $53,000,000, they face a future clouded by problems of rising costs, and labor unrest.

Gold, probably of placer origin, occurs in the quartzite matrix of certain conglomerate seams of amazing continuity (known locally as reefs), found in the sedimentary rocks of the Witwatersrand system over a 90-mile zone east and west of Johannesburg. The specimens shown above are typical of Rand gold ore.

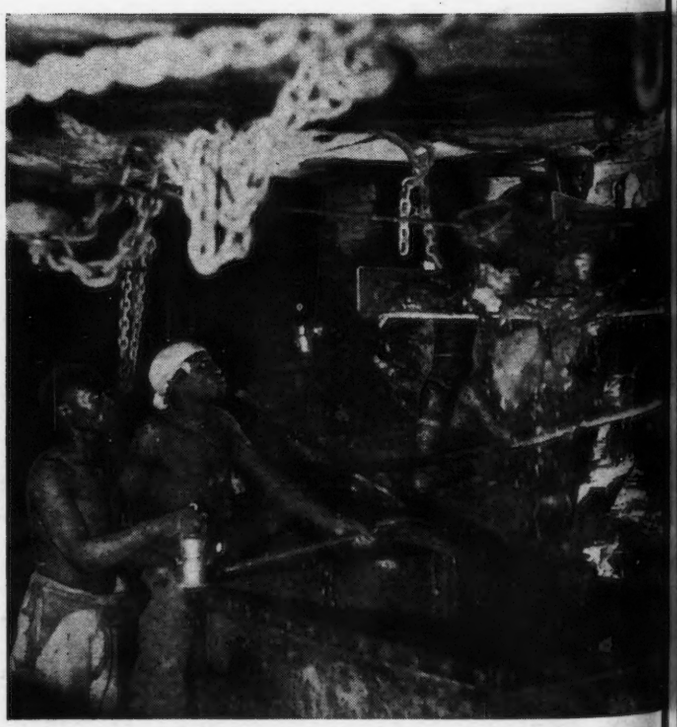
All but three of the Rand's operating companies (referred to on British stock exchanges as "Kaffirs") are controlled by one or another of seven British holding companies, which have an aggregate share value of about $5,000,000,000. Most powerful of the seven is Anglo-American Corporation, from whose Johannesburg headquarters (right) Sir Ernest Oppenheimer, chairman, directs an empire based on copper, coal, diamonds, and gold.

However, this towering financial structure is increasingly troubled by inefficiency and unrest of its 300,000 native laborers, like the Bantu ex-tribesman at right, who is engaged in scraping ore down a stope box from the mine working above.

(Continued on next page)

ROCK BREAKING on Rand is on a scientific basis, with every move planned. White miner inspects face, marks new holes. Drill team punches out 45 or more 3½-ft. holes per shift, gets bonus for speed. Narrow seams (20-in. minimum) require foot-held jackhammers. At one mine, total is 7,800 such holes daily.

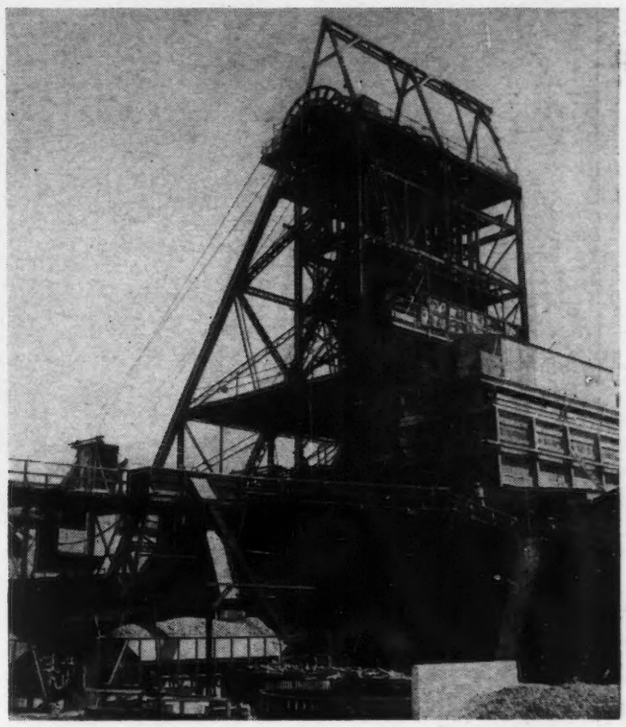
MUCKING OUT STOPES is hand work in older mines or scraper job in newer mines (right). Note width of seam at right. Boy behind scraper leans on footwall, his head touching hanging wall. Stopes are advanced along strike between haulage levels; few pillars are left. Stopes close again in time, or are filled with waste. Car at right feeds big scraper "gully" leading to haulageways. In one mine, 22 diesels haul ore underground.

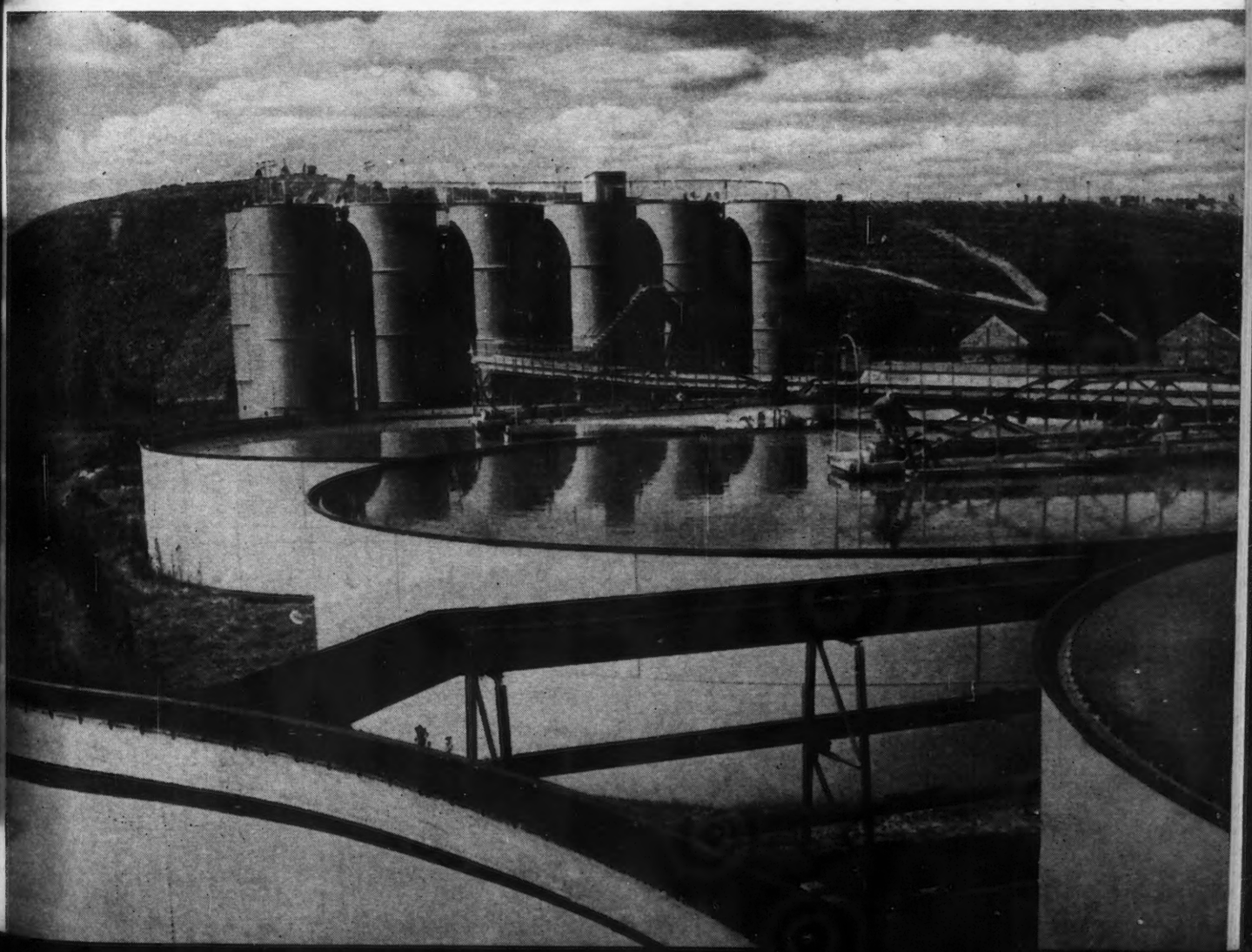


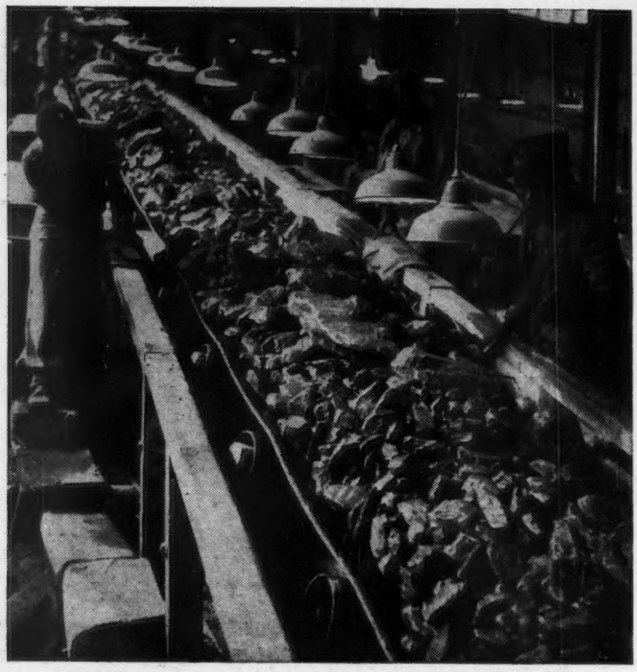
THE RAND'S MILLS reached a peak of 67,000,000 tons in 1941; last year treated 57,000,000 tons. Ore runs about $7. It is crushed in gyratories, ground by stamps or tube mills, and then cyanided. Recovery reaches 98%; costs run about $0.60 per ton. East Daggafontein's pachuca tanks and thickeners shown below.

(*Continued on next page*)

A 30-FT. HOIST DRUM of City Deep and Crown Mines headframe symbolize depth, the Rand's toughest technical problem. As mines near 9,000 ft., heat, humidity (from anti-dust sprays), and transport fix limits. An industry commission seeks solution.



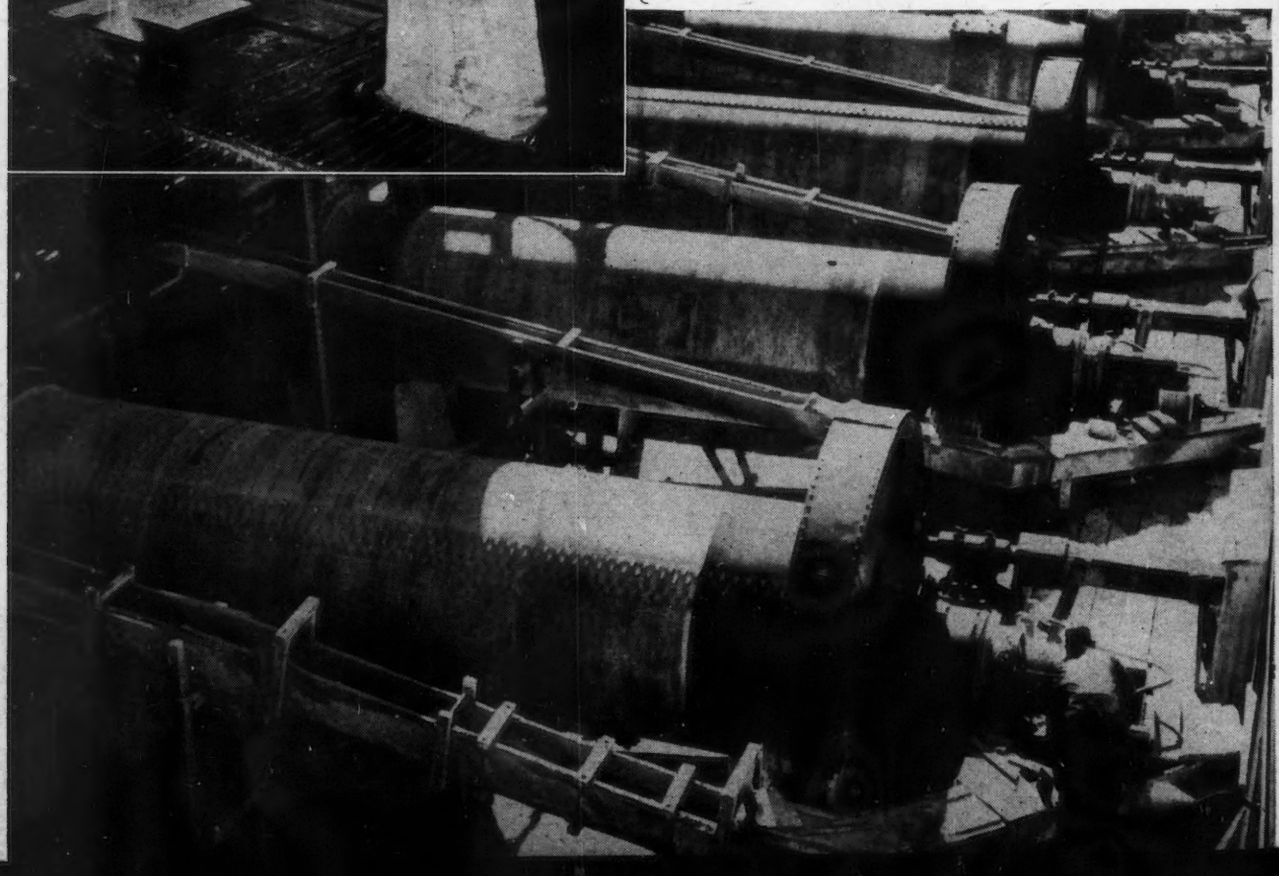




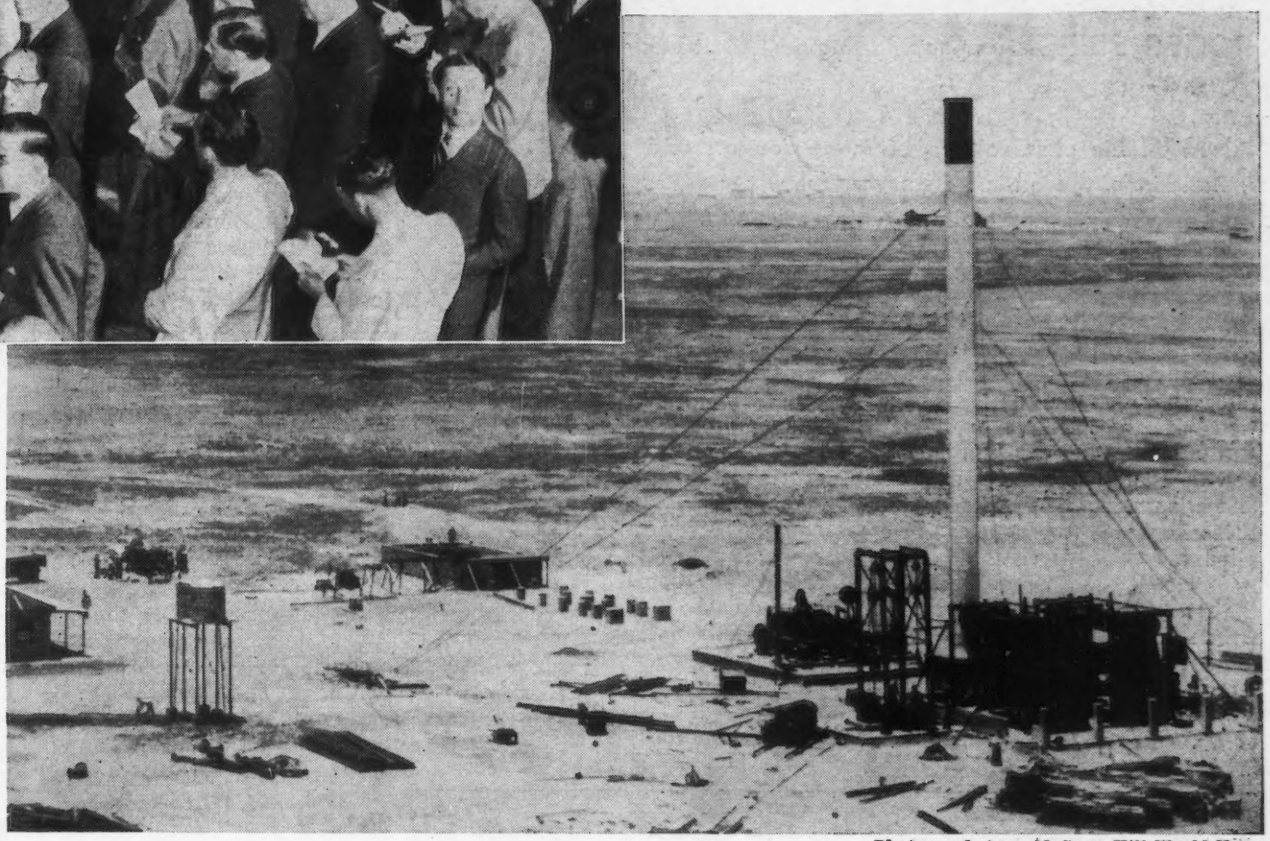
COOPERATION is characteristic of Rand's seven big mining houses, banded together in Transvaal Chamber of Mines, which sees to supply of native labor, formulates common wage policies, runs the central Rand Refinery (left), supervises safety, advises the legislature, and conducts research on common problems like rock bursts, ultra-deep mining, and silicosis. Each mining house may independently spend great sums on technical work.

Many mines use picking belts like one shown above, where waste rock, wood chips, and pebbles for tube mills are sorted out. Tube mills at City Deep (below) are typical of older practice; modern mills use steel launders, improved mills, steel balls as well as pebbles, every possible device to keep costs down.

Yet over-all costs continue to rise, squeezing profits against gold's fixed price to about $1.80 per ton milled, close to the $1.60 depression level of 1932. While seeking tax relief, progressive companies pin their highest hopes on mechanizing.



NOT A ROCK outcrops on this Orange Free State *veld*, yet modern methods located 1,000 ft. down the "sub-outcrop" of what may be a duplicate of the Rand's famous reef. Shown here is the collar set of the new field's first shaft, being sunk by an Anglo-American subsidiary. That company's drillers last April pulled a phenomenally rich core from a hole near Odendaalsrust, which touched off excited bidding for Free State gold shares (left) in Johannesburg, London. Hopes for Free State run high.



Photograph from McGraw-Hill World News

NEVER-ENDING PROBLEM is that of labor. Bantu blacks, secured by Chamber's Native Recruiting Co., live without families in compounds (new men enter, left), are cared for by companies, get average wage of $0.56 daily. Their skills are restricted by law; their earnings shrink before things like $3.10 shirt studied by native (right). Anglo-American hopes to eliminate compounds in new Free State mines and bring families in with men. Aim will be increased labor efficiency and fully mechanized mines.

New Ways to Apply Scraper Hoists to Mining

ROGER PIERCE, Consulting Engineer, Salt Lake City

Based on his observations of many foreign and domestic scraper installations, the author discusses costs, trends, and operating data, and emphasizes applications which take full advantage of the versatile functions of scrapers and scraper hoists.

SCRAPER UNITS introduce economies in mining operations chiefly because they combine the basic operations of ore transfer or haulage, and mucking and loading. A number of installations are described and illustrated here to show how these combined functions can be applied most effectively.

Installation 1. Scrapers on Grades. Taking advantage of the ability of scrapers to pull on up or down grades, one company installed a unit as shown in Fig. 1. Here a 50-hp. scraper hoist with a 66-in. scraper traveling at average round trip speeds of 300 ft. per minute up a 25% grade handles 250 to 400 tons of broken ore per shift. Maximum pull is 225 ft. In another operation, the scraper also pulls up an incline but discharges into a haulage drift below the scram drift, instead of over a ramp. Scrapers can also be used to pick up orebodies below a level, whereas any other method would require the development of another level below the orebody.

On grades where ore transfer with shaker conveyors, shuttle cars, belts, and motor traction is impossible, the scraper is best.

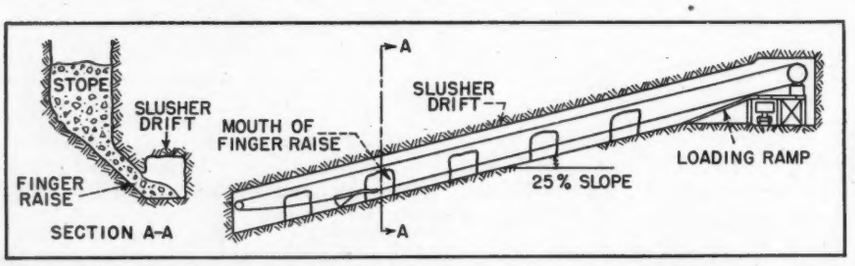


FIG. 1. SCRAPERS PERFORM EQUALLY WELL on the incline or on the level. In one incline installation the scraper discharges through a raise to a haulage level below, instead of over the ramp as shown.

Scrapers vs. Hand Tramming. Where ore must be transferred from chutes to a raise in intermediate transfer drifts, scraper slushing obviates slow tramming speeds, track installations, delays due to chute plugging, and spillage incurred with hand tramming. A light 8- to 10-hp. air or electric two-drum hoist with 36-in. scraper can handle ⅜ ton per trip at speeds of 130 to 175 ft. per minute.

For straight transfer operations, automatic hoists can be installed in which the scraper travels back to the loading point, stops, reverses, and pulls up a load to the dump.

One operator quotes scram drift costs as follows for a 20-hp. hoist pulling at speeds of 250 to 300 ft. per minute delivering roughly 300 tons per 8-hr. shift.

Cost of 20-hp. hoist, sheaves, cable and 48-in. ¼-box hoe scraper	**$2,000**
Cost per ton	
Upkeep of equipment	**$0.0035**
Power at 1¢ per kwh.	**0.0051**
Cable	**0.0115**
Labor	**0.0265**
Amortization of equipment, 2 years	**0.0100**
Total	**$0.0566**

Installation 2. For Crooked Drifts. In mines where sublevels

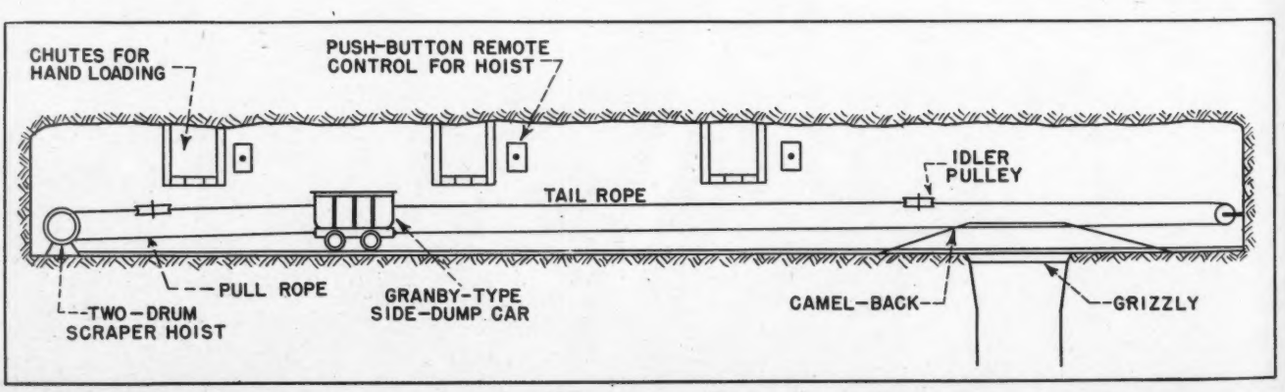


FIG. 2. FOR VERY CROOKED DRIFTS with soft, wet bottoms, scraper hoists may be used to pull cars as shown. The "trammer" merely loads the car at a chute and regulates the car movement by remote-control switches mounted beside the chutes.

are quite long, crooked, very wet, or have soft bottoms, scrapers are not as economical as car haulage. Here, as shown in Fig. 2, it is feasible to replace hand tramming by an automatic dump car transferred by two-way rope haulage. The workman remains at the chute while a double-drum hoist operated by pushbutton remote controls pulls the car to the dumping ramp and back. It is estimated that a 1- to 1½-ton car operated by a small two-drum hoist could make a 200-ft. round trip in less than 2 min., and the tonnage handled would triple that moved by hand tramming.

Driving a Sublevel With Scraper Hoist. A two-speed scraper hoist installed at a raise in a sublevel drift can perform the following operations during drifting: Muck out the face and transfer ore to the raise; handle supplies up the raise; move them from the raise to the face; pull drill jumbo mounted on skids to the face. Fig. 3 shows two-speed hoist for such purposes.

Installation 3. Scraper Over Grizzly. Normally grizzly men have to operate over grizzlies with safety belts, strenuously prying rocks loose or bulldozing them one by one as they appear. If a grizzly system is used, Fig. 4 indicates how the tonnage per shift can be increased by installing a scraper over the grizzly.

With this set-up, physical effort is eliminated, and boulders can be pulled aside until several of them accumulate. These can be blasted at one time, thus reducing the time lost for bulldozing, and the number of blasts per shift.

Scram Drift vs. Grizzly System. Although it is generally recognized that scram drifts are preferable to grizzlies for handling coarse rock, the following information is cited to show specific gains:

FIG. 3. A TWO-SPEED HOIST such as this can hoist materials up a raise, and then skid them to the working face of an intermediate drift. It can also muck out the face. Push-button control at operator's left provides the desired speed change.

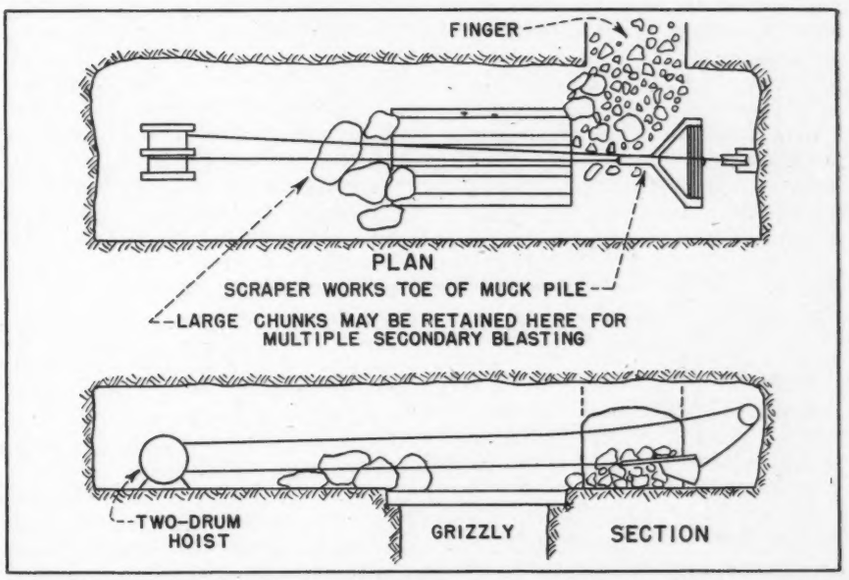


FIG. 4. SCRAPER ELIMINATES HARD WORK of hand grizzlying. Large chunks may be pulled to one side and blasted all at one time. Result: fewer blasts per shift.

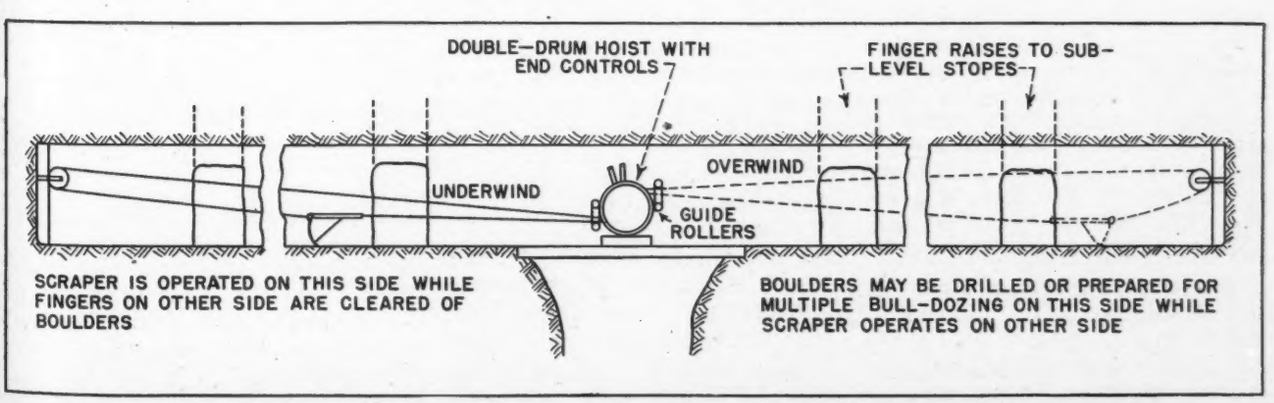

DOUBLE—DRUM HOIST WITH END CONTROLS
FINGER RAISES TO SUB—LEVEL STOPES
OVERWIND
UNDERWIND
GUIDE ROLLERS
SCRAPER IS OPERATED ON THIS SIDE WHILE FINGERS ON OTHER SIDE ARE CLEARED OF BOULDERS
BOULDERS MAY BE DRILLED OR PREPARED FOR MULTIPLE BULL-DOZING ON THIS SIDE WHILE SCRAPER OPERATES ON OTHER SIDE

FIG. 5. TWO-WAY SCRAPING increases the work done by a single hoist and minimizes delays for secondary blasting.

FIG. 6. CONTROLS AT END OF HOIST instead of behind drums are ideal for two-way scraping. If cable breaks, operator is safe.

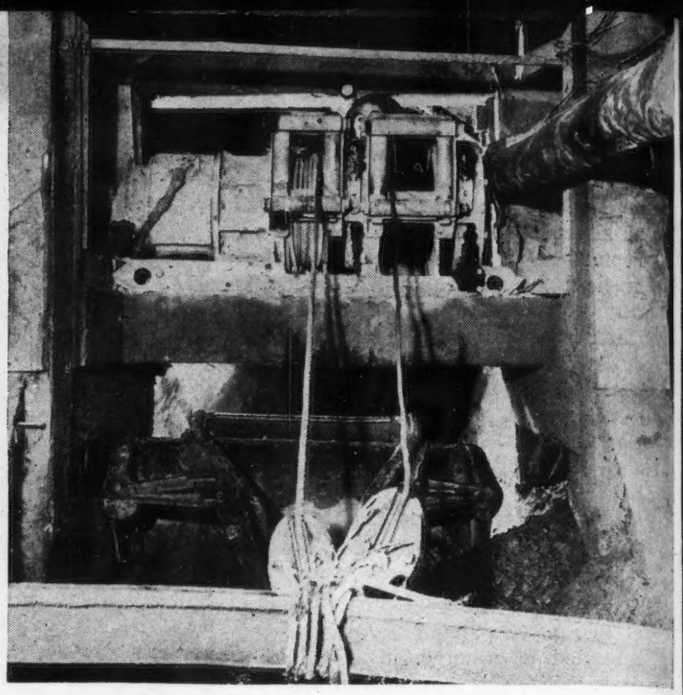


FIG. 7. HOIST IS MOUNTED above path of scraper for two-way scraping. Limited headroom is a disadvantage.

In one mine handling extremely coarse rock, 60 to 80 tons per man-shift were handled by the gravity-grizzly system, whereas a scraper hoist pulling 125 ft. and eliminating 9 raises and chutes, and 8 grizzlies, handled 165 tons per man-shift. There are many 50-hp. scrapers handling well over 250 tons per man-shift over distances up to 150 to 175 ft.

Chute Loading vs. Scraper Loading. Coarsely broken or damp ore often hangs up in the flatter offset section of a chute neck or mouth. It is often cheaper to load by scraper directly into cars under these circumstances. The total saving is more apparent when all costs and delays attendant upon chute loading are considered.

Three large mines have eliminated chute loading entirely, and one property handling more than 10,000 tons per day now loads nearly all of its ore by scrapers.

Time studies reveal a surprising number of delays in hand loading from chutes. Cars may be overloaded or underloaded. Spilling encountered requires clean-up labor, and hand loading from chutes is generally quite dangerous. In scraper loading large chunks can be eased into the cars, whereas they are literally propelled into the car from chutes.

Installation 4. Two-Way Scraping. When secondary breaking is frequently required, hoists should be installed to serve two-way scram drifts. The operator can readily switch from one drift to the other by unhooking a pigtail attachment (see page 88) on the front and back of a scraper and switching to a second scraper. It is possible to have two scrapers available, so that one may be disconnected from the hoist drum and the second attached to save time otherwise needed to transfer a single scraper.

Advantages of this system are: (1) While the operator is scraping from one side, a powder man can be preparing large rocks for blasting on the other. (2) The scraper is kept busy a greater part of the time. (3) Multiple bulldozing is possible if the scraper operator starts scraping from fingers farthest away from the hoist, and retreats toward the hoist as large rocks clog up these openings.

Fig. 5 shows one installation employing a hoist with end controls and roller guide brackets at front and back. When scraping from the left the ropes underwind on the drums, and when scraping from the right the ropes are brought around for overwind pulls.

The 50-hp. hoist in Fig. 6 is equipped with end controls. Three hoists of this type were operated by two operators who rotated from one installation to another at one property. They handled the entire mine output of 650 tons per day.

An alternate method of providing for two-way scraping is shown in Fig. 7. Although limited headroom is a disadvantage, this may be corrected by installing remote controls.

Installation 5. An Ideal Scram Drift. A number of desirable features are apparent in Fig. 8. Here the ore pass or raise feeds directly into the scram drift. No chute is necessary with the muck falling nearly vertically into the drift. In some mines the lower 10 or 15 ft. of the finger raise may be flattened to just the angle of repose to expose chunks so that they can be bulldozed. Multiple bulldozing is possible, thus reducing the blasts per shift and delays to actual scraping operations.

The size of the scraper is selected so that one trip fills one car. This synchronizes operations. While the scraper is returning to the end of the scram drift for a load, a new car can be spotted to be loaded on the pull trip. This system is comparable to measured loading from skip pockets in shafts.

To avoid tying up a locomotive and train crew during loading, a remote-control, air-operated single-drum hoist could be installed in the drift to lower cars down the grade during car spotting. Or if the grade is flat, a double-drum hoist with ropes attached to the front and back of the train can be operated by the slusherman through remote controls. Other desirable features such as two-way scraping could be incorporated in this installation, and the number of fingers feeding the drift could be increased.

This system is applicable in any mine where ore is drawn from stopes through finger raises to scram drifts, such as block caving, shrinkage stoping, or long-hole sublevel operations.

One company, using 50-hp. hoists in scram drifts with 66-in. scrapers

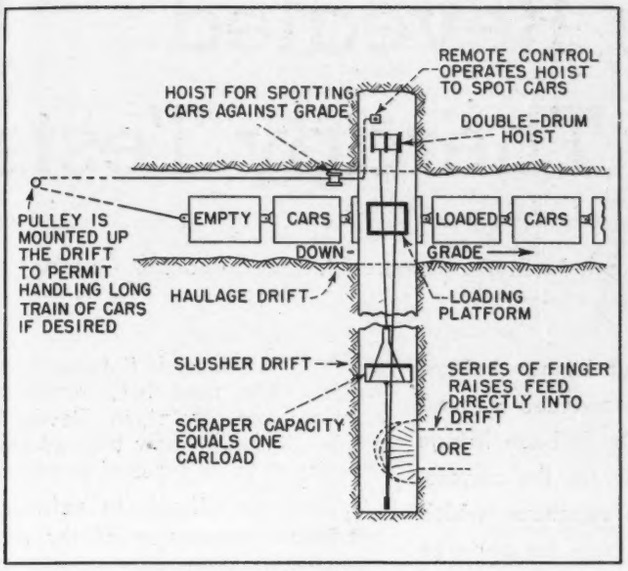

REMOTE CONTROL OPERATES HOIST TO SPOT CARS
HOIST FOR SPOTTING CARS AGAINST GRADE
DOUBLE-DRUM HOIST
PULLEY IS MOUNTED UP THE DRIFT TO PERMIT HANDLING LONG TRAIN OF CARS IF DESIRED
EMPTY CARS
LOADED CARS
DOWN-
GRADE
HAULAGE DRIFT
LOADING PLATFORM
SLUSHER DRIFT
SERIES OF FINGER RAISES FEED DIRECTLY INTO DRIFT
SCRAPER CAPACITY EQUALS ONE CARLOAD
ORE

FIG. 8. MEASURED SCRAPER LOADING, and spotting of cars by remote control are outstanding features of this ideal installation. Two-way scraping would be an added advantage.

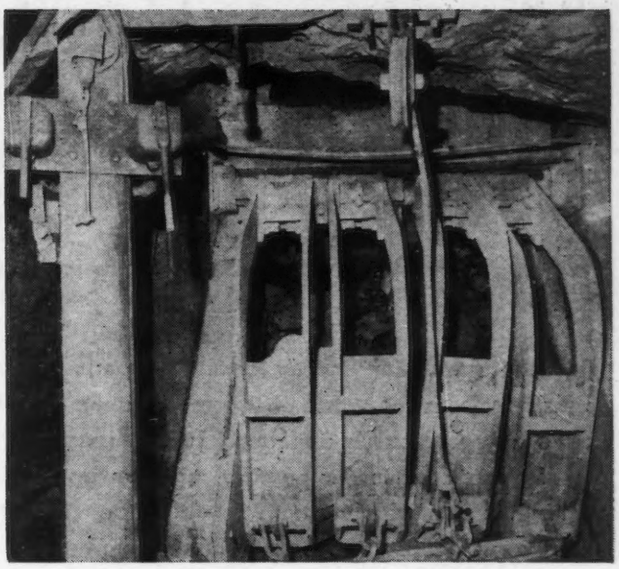


FIG. 9. ONE GOOD CENTRAL CHUTE with air-operated fingers and vibrators can supplant 12 to 15 semi-expensive loading chutes operating semi-efficiently.

pulling 100 to 150 ft., is delivering 200 to 300 tons of ore into cars per 8-hr. shift. Another company cites a record run of more than 1,500 tons loaded into cars per 8-hr. shift. These tonnages include delays for pulling fingers and blasting.

Central Loading. Another good system is shown in Fig. 9, where ore is gathered to one central chute and is delivered to the haulage level, instead of through 12 to 15 loading raises with semi-expensive chutes which operate semi-efficiently. One good air-operated chute gate with chute vibrators to keep the muck moving should be installed at the central loading point. Although such a chute costs three to four times as much as a hand-operated chute, speedier loading will more than offset the difference. The muck train can be loaded entirely from one point instead of stopping at numerous chutes to be loaded.

The accompanying table includes scram-drift data and performance records of mines in the United States, Canada, and Mexico.

INSTALLATION DATA AND PERFORMANCE OF SCRAPERS IN MINES

Type of Mine	Hoist Hp.	Speed, F.P.M. Pull	Speed, F.P.M. Return	Cable Size, In. Pull	Cable Size, In. Tail	Sheave Size, In. Tail	Sheave Size, In. Idler	Bucket Type	Bucket Weight, Lb.	Load per Trip, Tons	Distance Between Draw Points, Ft.	Size Material	Grizzly Opening, In.	No. Men. Scraping Crew	Performance and Length of Pull
Copper	50	250	250	1	7/8	5x18	5x8	66-in. 1/4-box hoe	2,600	2	20 Directly opposite	6 in. to 3x6 ft.	36	1	266 tons in 8 hr. 125 ft.
Hematite	40	300	350	3/4	5/8	10	8	54-in. 1/4-box hoe	1,450	1 1/2	75	1/4 to 8 in.	8	1	150 tons per hr.
Copper	50	300	400	3/4	5/8	12	6	60-in. 1/4-box hoe	1,685	...	60	6x10 in. to 12x36 in.	12	1	100 tons per hr. 150 ft.
Tungsten Molybdenum	50	250	250	3/4	5/8	14	8	60-in. 1/4-box hoe	1,690	1	15	16 to 22 in.	.....	2	100 tons per hr. 90 ft.
Magnetite	50	250	330	3/4	5/8	10	...	60-in. 1/4-box hoe	2,100	2 1/2	35	9 in. to 3 ft.	20	1	75 tons per hr. 350 ft.
Copper	25	200	260	1/2	1/2	26	4	52-in.	1,200	1	25 Staggered	10 to 30 in.	12	2	228 tons per hr. 90 ft.
Copper	30	250	330	5/8	1/2	12	8	42-in. 1/4-box hoe	1,482	...	15	10 to 36 in.	12	1	100 tons per hr. 125 ft.
Molybdenum	100	250	250	1 1/8	1 1/8	18	8	60 to 72-in. semi-box	3,200	3 to 4	25	24 in. to 4x6 ft.	Direct car loading	2	800 tons per hoist-shift. 125 to 150 ft.
Magnetite	50	250	330	7/8	5/8	14	...	60-in. hoe	1,700	3,300 lb.	40	10 to 60 in.	24	1	300 tons per shift 100 ft.
Copper	20	250	330	5/8	1/2	10	Roller Frame	48-in. hoe	648	3/4	15	1 to 11 in.	11	2	200 tons per shift 60 ft. average
Copper	50	250	330	7/8	7/8	18	6x4	66-in. 1/4-box hoe	2,600	1 1/2	30	18 to 120 in.	24	1	160 tons per hr. 125 ft., max.

Note. Performances vary directly with the amount of secondary blasting required in scram drifts.

Medical Facts Revealed By Aluminum Therapy Tests

W. D. ROBSON, M.B., M.D., Chief Medical Director, McIntyre Research, Ltd., Schumacher, Ontario*

Because aluminum therapy involves experiments with human beings, conclusions on the value of this method can only be reached through painstaking research and accurate observation. Dr. Robson brings the lay readers in the mining industry up to date on the physiological effects of aluminum powder, the chemical reactions which take place in the lung, and outlines a program which he believes can eventually eliminate the silicosis hazard.

Eleven years ago in March 1936, *the late J. J. Denny and the author discovered in the laboratory at McIntyre mine, that a minute quantity of metallic aluminum almost completely inhibits the solution of quartz in water and simulated lung fluids. Since then, and in accordance with the procedure applied to any new discovery in the field of medicine, the use of aluminum powder in the prevention of silicosis has passed through the usual stages of animal experimentation; human application to selected groups of volunteer silicotics; and has, since* 1936, *been made available to employees of the mining industry of Canada who are exposed to a silica hazard.*

Throughout these various stages many problems arose and were dealt with. "We are still confronted with many questions which need elucidation," says Dr. Robson, "but there are none which I feel will not be answered satisfactorily in the course of time."

Three years ago, Dr. Robson presented a paper before the Canadian Institute of Mining and Metallurgy in conjunction with other papers by Dr. J. W. G. Hannon and A. W. Jacob. These reported to date on the progress being made in aluminum therapy.

* Summary of an address before the Canadian Institute of Mining and Metallurgy, Ottawa, Jan. 1947.

DURING THE PAST THREE YEARS, aluminum prophylaxis, to prevent silicosis, has been made available, by treatments in change houses, to some fifteen thousand men in Canada and other countries. In addition, therapeutic treatments by special individual methods have been given to several thousand men, in mining and other industries, to halt or retard the disease. During this period considerable experience in the practice of aluminum therapy has been accumulated. Consequently, this article presents certain medical aspects of the subject and outlines the proper procedure in applying aluminum therapy.

Animal Experimentation

The early dusting experiments at the McIntyre mine showed that animals which retained by inhalation, aluminum powder in their lungs to the extent of 1% of the quartz dust present, gave no evidence of silicosis, but in those animals whose lungs assayed less than 1% of aluminum, in terms of the quartz present, there were occasional areas of nodulation. In these areas there was no evidence of aluminum being present. This may have been because insufficient aluminum powder was inhaled by the animal; much of the powder was not sufficiently fine; or the powder which was inhaled did not reach the area involved.

From these repeated and controlled experiments, and others conducted by Dr. D. A. Irwin at the Banting Institute, and the late Dr. L. U. Gardner, of Saranac Laboratory, who used both hydrated alumina and McIntyre Research powder, we now know that administration of these types of powders:

1. Prevents silicosis in animals;
2. Halts progression of the disease in animals;
3. Clears up and allows to return to normal those parts of the lung showing early inflammatory reaction associated with the development of the disease;
4. Is harmless in uncomplicated cases (X 1010—hydrated alumina—may be harmful in complicated cases).

Powder Is Harmless

As most silicotics do not die from silicosis, but from tuberculosis, the effect of McIntyre powder in such complicated cases had to be determined. Accordingly, Dr. D. W. Crombie, superintendent of the Queen Alexandra Sanatorium, at London, Ontario, conducted experiments on a group of silicotics who had early tuberculosis. This research was sponsored by the Ontario Mining Association. It began in 1942, and though the administration of aluminum to these individuals was completed in 1943, observations continued to be made on their condition. The results to date show that McIntyre powder has no effect one way or the others in cases of this kind. Dusting tuberculous animals with it, Dr. Gardner obtained similar results.

Dr. Gardner also carried out extensive experiments on animals, employing a special hydrated alumina, X 1010. He has stated that in such cases a subsequent tuberculosis in animals is influenced unfavorably by very dense concentrations of the powder. Experiments are being repeated, using smaller therapeutics doses, but unfortunately the death of Dr. Gardner interfered with publication of these results.

German literature has mentioned what has been called "aluminum lung." More recently, a somewhat similar condition is being mentioned as occurring in one type of industry in Canada. Before these exposures can be attributed to aluminum, or aluminum oxide, many other factors which enter into the question must be answered. In the German case the author points out that no such condition was observed prior to the introduction of a synthetic stamping lubricant. Blackout conditions, scrap metal, slave labor, and food rationing also enters into the picture. In the Canadian exposure, the presence of a high percentage of free amorphous silica of extreme fineness, in the aerial dust, was increased many fold by wartime production.

Even then, should these exposures be definitely proved to be due to the particular type of aluminum used in these processes, it should not be inferred that all types of aluminum will act in a similar manner. It was for this reason that McIntyre Research, Ltd., patented the process and insisted on the sole control of its own particular type of aluminum. The hydrated alumina used by Dr. Gardner (the special X 1010) is a stable hydrated aluminum oxide specially prepared for his use by the Aluminum Research Laboratories. These are the only two aluminum powders which have to date proved successful in the prevention of silicosis in animals. They are the only two preparations which McIntyre Research, Ltd., will approve at present for the treatment of human beings.

Chemistry of Aluminum

The chemistry of aluminum is very complex. There are hundreds of different compounds of aluminum and many different forms of the oxide. Some are formed at ordinary temperatures; others are formed at high temperatures. We do not know what the body tissue reaction to *all* these aluminum compounds or oxides might be. We do know from the experimental work on animals, and in the thousands of cases of men who have been treated prophylactically and therapeutically, that no such condition ("aluminum lung") as described in these articles has been produced from the use of either our powder or the X 1010.

Aluminum powder is able to prevent silicosis by an electrochemical reaction which takes place in the cytoplasm or semi-fluid medium of the dust cell. When such a cell engulfs a particle of silica and a particle of aluminum, they both begin to go into solution, the former to produce silicic acid and the latter to form aluminum hydroxide. Because the silica is negatively charged, the positively charged aluminum hydroxide is adsorbed to the surface of the silica particle. This adsorbed coating on the quartz particle prevents its further solution to the extent that a toxic concentration of silicic acid is no longer produced. Thus the whole theory of the prevention of silicosis by aluminum is based on the coating of the silica particle to prevent it from producing a toxic substance which damages lung tissue. To be effective, the aluminum powder must be engulfed by the same cell which picks up the silica.

Particle Size

Damage to lung tissue, from the inhalation of particulate silica, is in proportion to its degree of fineness. It may be assumed, therefore, that the greatest damage to the lungs of men exposed to a silica-impregnated atmosphere will be from the particles of less than one micron (1/25,000 of an inch). This fraction of the dust cloud is the most difficult to eliminate.

In my opinion, sufficient importance has not been placed on these ultrasmall particles of less than one micron in evaluating the development of silicosis.

As particles of one-half micron and under will stay suspended longer and travel farther in an air stream is is only logical to assume that these aerosols, when inhaled, will undoubtedly penetrate through the bronchial tree to the farthest, most superficial areas of the lung. It is quite possible that this may be an additional reason for the early appearance of nodulation under the pleural surface of the lung rather than in the intermediate portions.

Therefore, to be effective, the aluminum powder inhaled must be of the same degree of fineness as the silica. Otherwise it will not reach the most distant parts of the lung and will have no effect on the fibrosis being produced in these areas. The McIntyre Research powder particles are 99% under five microns and approximately 90% one micron and under.

With a compressed-air ejector this powder can be resuspended as individual particles of the abovementioned size. This principle has been incorporated in a dispersal chamber to administer treatments.

Therapeutic Treatment

The primary claim for aluminum was its use as a preventive of silicosis. It was realized that years would be required to assess its value as a prophylactic measure, because it requires an average of 18 years for a case of silicosis to develop in the mines of Ontario.

Following the promising results obtained in the treatment of silicotic animals, selected groups of volunteer silicotics were treated therapeutically in a clinic in the Porcupine camp under the direction of Doctors W. D. Crombie and J. L. Blaisdell, and in one established by Dr. J. W. G. Hannon in Washington, Pa. These experiments ran for three years. The results obtained were similar; both groups reporting:

1. That the inhalations of this special type of aluminum powder, in the amounts used, produced no evidence of toxic or harmful effects in the cases treated;
2. That a certain percentage of the patients showed functional improvement as demonstrated by special lung function tests. These recorded improvements in the functioning of the lung were evinced by the measured increase in lung ventilation;
3. That a high percentage of the patients treated showed symptomatic improvement was evinced by disappearance of cough, shortness of breath, tightness in the chest, and weakness. Most showed a gain in weight.

The question arises: How are we to evaluate these results?

Accurate measurement of the lung's ability to function normally, or varying degrees thereof, is affected by many variables between individuals and in the same individual. This is so to such an extent that the accuracy of present lung function tests is seriously open to question.

To the best of our knowledge, no scientific tests have been devised for measuring improvement in a patient's symptoms. The doctor must take and weigh the evidence volunteered by the subject. This

being so, one may ask: Do the symptomatic improvements attributed to the use of aluminum therapy mean anything, or are they purely psychological? The question is important because few of the men treated showed measurable functional improvement of the lung. We believe that psychology does play a part in these cases. However, owing to the large number of men treated to date who show similar improvement in their symptoms resulting from exposures in various siliceous industries, we do not feel that this is the complete answer, especially when symptomatic improvement, in many cases, has enabled previously incapacitated men to resume their former occupations.

An Explanation

These symptomatic improvements might be explained as follows: It is generally accepted that silica produces its harmful effect on lung tissue because a toxic (chemical) product is formed by or during the dissolution of the silica particle. This toxic material is sufficiently powerful to cause an inflammatory reaction, destroy body cells, and also to stimulate the formation of fibrous tissue. Whether or not this toxic material or its by-products may also have a more or less systemic effect is not known. Should this be the case, the elimination of this toxin by the coating of the silica particle with aluminum could readily explain these symptomatic improvements. This might be compared to the elimination of the toxic source (of infection) in certain types of rheumatism, cold, or influenza which is responsible for the symptomatic improvement in these cases.

Aluminum therapy should be applied from the time a man first becomes exposed to a silica hazard and for a certain period after this exposure ceases. If this procedure be followed, we do not believe that *new employees* will ever develop silicosis in the mines provided all other controls are properly maintained.

Some thousands of men, employed in siliceous industries throughout the world, have been receiving prophylactic and therapeutic treatments with this powder. In three years' time, we have not heard of a single instance wherein any harmful effects have occurred which could be attributed to its use. We therefore feel that a sufficient number of men have been treated over a sufficient period of time definitely to establish the harmlessness of this particular type of aluminum powder.

This being true, the application of aluminum therapy resolves itself to:

1. An adequate dust control and ventilation program;
2. An adequate medical control program;
3. Types and methods of treatment;
4. The estimation of adequate dosage; and
5. Methods to be used for assessing its value.

In mining where underground conditions are continually changing, proper ventilation and dust control are extremely difficult to maintain at all times. Aluminum is to be used only to take care of that small percentage of silica dust which is not removed by accepted modern dust-control methods.

Lest aluminum prophylaxis on a mass scale encourage a tendency toward slipshod methods of proper dust control and ventilation, McIntyre Research included the clauses in the yearly agreement stipulating that a license may be canceled if any company fails to reduce dust concentrations to the possible economic limit.

Just because miners breathe a small amount of aluminum powder suspended in the atmosphere of the change room, they should not conclude that large amounts of dust underground would be harmless. They have all been instructed, and should be reminded continually, that this powder will protect them only from a small quantity of silica dust inhaled during the shift.

Medical Control Program

An adequate medical control program is practiced throughout most of the metal mines in Canada. An applicant is examined first by the company doctor and sent for an X-ray of his chest. These X-rays are passed on by specialists in tuberculosis and silicosis. If the applicant's picture shows no evidence of tuberculosis, he is issued a permit to work. Once a year he must present himself for a recheck and another X-ray picture.

Should a man at any time show merely a suspicion of tuberculosis, he is called in for special investigation, consisting of blood sedimentation, repeated sputum examinations, stereo X-rays, etc. If he has no positive sputum, he is allowed to continue work but he is reexamined every three months, both clinically and by X-ray. Should he develop a positive sputum, his work permit is immediately taken up and he is sent to a sanatorium for treatment. All contacts are also checked to determine the source of infection.

Change-House Treatment

The amount of aluminum powder suspended in the atmosphere of the change house in any mine is based on one gram per thousand cubic feet of room content for a ten-minute exposure. This concentration, due to dilution, should not decrease more than 40% in one hour. We believe this amount is sufficient to take care of the silica dust to which the workmen might be exposed during the ensuing shift. There are, however, various factors which enter into this method of treatment:

1. Workmen being treated will be subjected to various concentrations of siliceous dust at the working place. They will have accumulated various amounts of dust in their lungs, depending on length of service and their individual susceptibility.
2. Certain men will inhale more aluminum powder than others because they breathe faster, more deeply, or spend more time in the change room.

Therefore it is impossible to give an exact specified amount to every man prior to each shift. However, as our aluminum powder is harmless, we can see no reason why it should not be administered as presently done. The man who stays in the change house less than the prescribed time is at least getting some benefit by the amount inhaled, and the man who stays longer is in no danger of suffering any ill effects.

We believe that all miners in Canada whose chest X-rays show dust accumulation should be given at least one course of therapeutic treatments. The purpose of this course is to stabilize any immature lesions which might be developing in their chests and which at this stage do not show on the X-ray film. This therapy should be under the supervision of a doctor and the actual treatments administered by a technician, preferably a fully qualified nurse.

A standardized system of records should be used, showing an industrial history from the time the man started work, history of past

illnesses and present symptoms, the results of physical examination, X-ray classification, number, length and duration of the treatments, and annual and semi-annual rechecks.

At present we advocate a course of fifty treatments, commencing with two minutes and increasing the subsequent treatments two minutes until a maximum of ten minutes is reached. Treatments should be given every other day. On completion of the first course of treatments, the doctor should recheck the patient and record his findings.

In certain cases which continue to show increased markings on their subsequent yearly X-ray examination following one course of treatment, another course of treatment should be given. The number of treatments and the number of courses necessary will depend on the doctor's conclusions regarding a man's mining history and his physical and X-ray findings.

More advanced cases showing a presilicotic or silicotic stage should be given a course of treatment, then reexamined and X-rayed in six months to determine whether or not another course of treatment is necessary.

Adequate Dosage

Although we can deliver a known amount of powder, of a particular degree of fineness, for a given length of time, to a man's mouth, we have no means of telling how much the man retains in his lung nor have we any means of knowing whether the powder has reached those areas of the lung containing the silica, in sufficient quantities to neutralize its effect. We can, however, be assured that the amounts as recommended will do the patients no harm. The therapeutic dosage to be administered by the doctor in charge of the case must be determined from the results of the examination.

In order that therapeutic treatments may be administered to those men who have long mining histories or who, in spite of the change-house prophylactic treatments, show an increase in their lung markings, information as to their X-ray findings must be made available to the doctor who is in charge of the treatments. Miners can then be advised of their condition and avail themselves of aluminum therapy, the only presently known means of preventing and stabilizing the silicotic condition.

Assessing the Value

The assessment of the value of aluminum therapy will take time and will be difficult in the mining industry. Improvements in mining methods and dust control will take place and it will be difficult to say whether the decrease in the incidence of silicosis is due primarily to the use of aluminum or improvements in these methods or both. *The real test will be the effect of the use of aluminum on those men who had had no previous mining history prior to the introduction of aluminum prophylaxis.* A true estimate of its value cannot be made from the therapeutic treatment of already established silicotics or presilicotics. The best we can hope for in these cases is a stabilization of their condition, and this only in areas of the lung which have not as yet developed to the stage of early fibrosis. In those parts of the lung where fibrosis is present it will continue to progress to nodulation in spite of aluminum, and the X-rays of these men will show an increase in their X-ray markings as the fibrosis becomes more dense.

Medical discoveries are subjected first to animal experimentation because animals can be sacrificed and pathological studies made of their organs. Conclusive proof may be obtained in a relatively short time as to the harmfulness or harmlessness of the therapeutic agent being studied. Naturally this procedure cannot be carried out on human beings except where death results from accidents or other causes. In South Africa and Australia, the accepted procedure is that an autopsy is performed at the direction of a Government agency on all men suspected of having silicosis or at the request of the family if they wish to enter a claim for this condition. We feel that if the compensation boards of the various provinces would institute such a measure, indisputable proof would be obtained in assessing the true value of aluminum therapy.

Through the cooperation of management, labor, and compensation and public health boards of various provinces, adequate methods may be formulated to evaluate the beneficial effects of aluminum therapy. If this is accomplished, definite results could be expected in five years, and I feel sure that so far as the mines of Canada which have a silica hazard are concerned, the fear of, and the development of, silicosis amongst the miners will be eliminated.

A. W. Jacob, ventilation engineer, McIntyre Research, Ltd., will discuss engineering aspects of aluminum therapy in a subsequent issue of *E.&M.J.*

Improvements in Stocking Newly Mined Sulphur

AT NEWGULF, TEXAS, where Texas Gulf Sulphur Co. is "mining" sulphur by the well-known Frasch process, involving the pumping of superheated water down a borehole to convert the sulphur to liquid form, in which condition it is brought to the surface, where it is allowed to solidify, retaining walls of congealed sulphur have been substituted for the wooden or metal forms previously used for holding the liquid sulphur in stockpile while freezing, according to H. E. Treichler, general manager. These walls are built by erecting two-sided aluminum forms around the stockpile area, and filling them with liquid sulphur. When this has congealed, the forms are raised and the operation is repeated.

To support the pipe lines that deliver the liquid sulphur to the stockpile, tripods with tapered aluminum legs are used. These are set at 30-ft. intervals through the center of the area to be filled and the sulphur is let congeal to heights of 15 inches or more. The tripods, with the pipe lines, are then raised and moved slightly so as to rest on the solid sulphur, and the operation is repeated. This eliminates the wooden supports previously used, which had to be left in place as the stockpile was filled, where they gave trouble subsequently when the sulphur was blasted for loading.

In shifting the standard-gage loading tracks much hand labor required for "picking" the hard bottom and leveling the surface has been done away with by using a heavy, rubber-mounted Caterpillar road scarifier and grader.

South America Wants Share in New Enterprises

R. H. RAMSEY, Associate Editor

MEMBERS OF THE MINERAL INDUSTRY cannot afford to overlook the significance of current developments in Latin America. Our need for outside mineral resources is growing, and with it, the need for Hemispheric economic unity and political harmony. In our common search with Latin America for security and peace, our best chance of success lies in understanding of each other's problems and in cooperation wherever possible.

To learn something of what is going on in Latin America, I traveled last winter through Brazil, Argentina, Chile, and Bolivia. I visited mines and talked with mining men, but I also sought views on the political and economic framework in which those mines operate. Some of the things told me were alarming, others were reassuring, but all were intensely interesting. Herewith is an account of those that I found most interesting of all.

Welding a Bloc

For years South America has suffered from an economic disunity that threatened to block progress. Argentina, for example, had food; Bolivia, had metals; yet Argentina imported metal products from another continent, and Bolivia often went hungry. Brazil has iron ore and coal but needs wheat badly; Argentina has wheat but wants steel. The logical course would be to pool their separate abilities and products, just as do the several economic areas of the United States, but economic logic has not always been a factor in international relations.

Now, at long last, an economic unit is being welded in South America, but the embarrassing thing is that the job has been undertaken by a man with whom the United States has had at times a considerable difference of opinion, to put it mildly. Juan Domingo Peron, duly elected President of Argentina, has concluded mutual assistance pacts this winter with Chile and Bolivia by which Argentine food and money will be traded for Chilean and Bolivian raw materials. He will no doubt try to achieve similar agreements with others of his neighbors, and there may be formed the kind of economic interchange among those countries that should have been developed years ago. One's approval of this economic unit is diluted, however, by some doubt as to Peron's objectives. If he and Argentina will work for the common good of the Western Hemisphere, he should get all the help we can give him. But if Peron's view is disruptive to Hemisphere harmony, there will be trouble for him and for us.

Rise of Industry

The second great change in Latin American economics is the sudden increase in the urge for industrialization there. Brazil is now completing a steel plant that could turn out 300,000 tons of steel products a year. United States steel production now runs about 1,700,000 tons a week. This is a fair index of the relative progress of industrialization in the United States and South America, but it is far from a fair measure of South American eagerness to industrialize.

Everybody in the countries I visited, even clerks in some of the stores, was conscious of the need for expanding local industry. Their pride, as well as their standard of living, demands it. With what pleasure they point to a razor blade marked "Industria Brasileira." The fact that the razor blade is really not very sharp is of secondary importance.

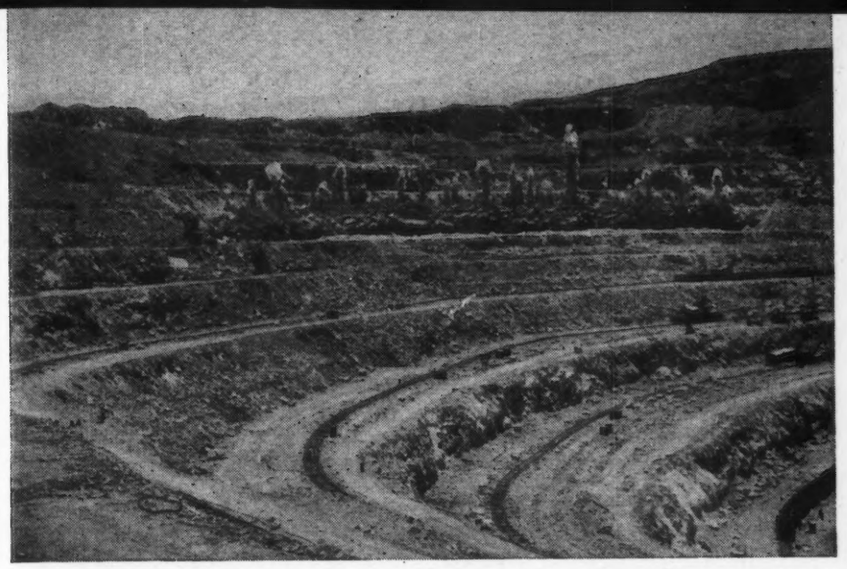
One must recognize this urge to industrialize in South America, and, indeed, we could profit greatly by it. We certainly cannot go on indefinitely expecting the economy of Bolivia, for example, to be turned on and off like the kitchen stove as our needs for tin and tungsten fluctuate. With such a dependent economy Bolivia is bound to be terribly vulnerable to outside conditions and to be prey to disruptive influences. Nor can such countries provide the market for our goods that they would if their standards of living had been raised by their own industries. Industrially speaking, much of Latin America is right now about where the United States was at the end of the Civil War, and the opportunities for expansion are tremendous.

Consider Brazil. In Rio de Janeiro the water supply system is so inadequate that whole areas of the city have not had water for months and almost nowhere in the city does water run oftener than twice daily. The street car and bus systems of Rio are hopelessly inadequate. New express streets ought to be built; new housing constructed. The railways and highways of Brazil are for the most part primitive. There is a tremendous demand for serviceable, but cheap, goods of all kinds, almost all of which now have to be imported.

These things could also be said of the other countries I visited, except Argentina, which is truly a land of plenty. In a time of worldwide meat and bread shortages, Argentina had plenty of both. Soap and butter were handed out lavishly in the hotels. "Argentina," a hungry Brazilian told me, "has everything." This is almost true. Argentina has foodstuffs, money, energy, and brains. She has access to most raw materials, and if she also has statesmanship, she can lead South America to a better life than the continent has ever known.

Inflation Everywhere

Of far more immediate concern than either of the foregoing developments, however, is the problem of inflation, which has hit more severely in the countries I saw than it has here. In addition, unwise policies of government have created trouble unnecessarily in some cases, as for example in Chile, where pay to the armed forces and



HUGE CAPITAL INVESTMENT is required before ever a pound of copper is mined from an open pit like this one. Shown here is a comparatively small blast (80,000 tons of rock or so) in the Chuquicamata mine, in Chile, prime example of the type of capital investment that recent developments in Latin America do not tend to encourage.

to government employees was raised 25% a couple of years ago. In a nation of 4,000,000 people, where nearly every family has one or more members in either category, the inflationary effect of this raise was tremendous and immediate. The result is that a white shirt of about $1.69 quality actually costs $9 (U. S.) in Antofagasta. Even in Argentina, untroubled by shortages, prices have risen sharply of late, largely because Peron over the past year has by decree raised all workers' wages a total of about 25%.

The Political Pot

It is against a background of inflation, discontent, changing economic emphasis, and labor trouble (which I haven't mentioned, but which certainly exists) that one must regard the political scene in the countries I visited. Because the nature of one's politics in Latin America may become quite literally a matter of life or death, interest in government there has always been intense among a few of the groups most likely to govern. Lately, however, interest in politics is becoming more widespread and even more intense, if anything.

Brazil, they told me there, was going to pieces under Vargas, the dictator, until a quiet revolution was arranged in the fall of 1945 and Vargas was escorted out. Contrary to past Latin American practice, Vargas was not harmed; in fact he later ran for Senator from a southern state and was elected.

Winner of the presidential election that followed the revolution was Eurico Dutra, straightforward middle-of-the-road army man, who seems sincere in trying to get Brazil back on a democratic basis. The big problem he faces is popular discontent over things like bread shortages, sky-high prices, jam-packed busses and trolleys, and inadequate, impure water supplies.

The Communists in Brazil are fanning the flames of discontent with all their strength and they blast at "Yankee imperialism" at every opportunity. Brazil and Dutra deserve our best help, because we ought to try to preserve democracy, if we believe in it, against the assaults of Communism everywhere.

Chileans are a pleasant, friendly sort of people that seem particularly undeserving of their troubles. Having once been a resident of San Francisco, I felt completely at home in Santiago, because the two cities seem much alike to me. Yet during the week I was there, a Communist mob terrorized a meeting and wrecked several automobiles, one of which they knew belonged to the Spanish Ambassador; there were several smaller political riots; and choice of a President in a run-off election was undoubtedly influenced, if not actually decided, by the Communists' threat of a general strike.

The President thus elected, Sr. Gonzalez Videla, is no Communist, however, and he seems willing to fight against Communist domination. However, Chile's severe inflation has greatly strengthened Communism, and Chile's most powerful labor unions are Communist-led. Chile will be helped in fighting both inflation and Communism by the recent economic pacts with Argentina, but she probably runs a risk of attaining security and losing freedom of action. It all depends on whether Peron chooses to behave like Grandma or the wolf.

In Bolivia last July, a Fascist-minded regime, with all the familiar trappings of beatings, executions, concentration camps, and absolute tyranny, was driven out in a short but bloody revolution. The people who took over the Government were for the most part fair-minded, intelligent men who did their best, I am convinced, to set up a government that would run Bolivia for the greatest good of the greatest number of its people. The job is not easy.

The revolutionary government held an election in January, which was narrowly won by Dr. Enrique Hertzog, a surgeon of great ability who had served his country in the Chaco war, but who had been arrested, tortured, and exiled by the former regime because of his liberal views. Despite this, he returned at great risk to Bolivia in early 1946 to help found the *Frente Democratica Antifascista*, one of the forces that finally overthrew the Villaroel regime in July 1946.

Bolivia has for the moment a Government elected by the people, but it remains to be seen how long that Government can hold on. The treasury was drained dry by the Villaroel group, and Hertzog's Government has nothing but current income to go on. The cost of living is rising, and misery and poverty rise with it. The tin miners, workers in Bolivia's only real income-producing industry, are restive and troublesome under the leadership of Juan Lechin, a Bolivian John L. Lewis of great power and ambition. Communists are believed to be too few in Bolivia just yet to be really troublesome.

The question is: Can Hertzog stay on top of all this and at the same time begin an attack on the problems that have always plagued Bolivia; namely, lack of transportation, lack of agriculture, widespread illiteracy, and a very low standard of living of most of the people? If he can, Hertzog will deserve the applause of all the world. I hope he can count on our help as he makes the effort.

Argentina and her urbane, personable, but tough-minded president, Juan D. Peron, loom largest

in any discussion of South American affairs. Argentine power for good or evil surpasses at the moment that of any other country south of the Rio Grande. What, then, of the man who currently directs that power?

Colonel Peron owes his position and his strength to a personal popularity with the Argentine people that can arouse mass hysteria. Mobs, reminiscent of those that once cheered Mussolini, gather in the Plaza de Mayo to listen to Peron and to roar out their chant of "Pay-*ron!* Pay-*ron!* Pay-*ron!*" Bands of callow ragamuffin youths roam the streets yelling Peron marching songs and shouting defiant boasts. Peron's husky policemen don't permit these boys to break anything, however, except occasionally the front windows of *La Prensa,* South America's leading newspaper and one of the very few Argentine journals still daring to differ with Peron.

Peron vs. Communism

A hater of Communism, Peron yet has won over all Argentina's labor unions except the packing house workers, with whom he still has a little trouble. This popularity Peron buttresses by a combination of tactics borrowed from F.D.R., Huey Long, and Adolph Hitler. He mixes nation-wide wage increases and paid compulsory holidays with demagogic appeals to his "*descamizados*" (shirtless ones) to join him in his fight against "the sinister influences of false democracy." The *descamizados* love it, but Argentina's liberals and big landowners aren't so sure.

Yet it is true that to date Peron has done a few things to better the lot of the Argentine people that should have been done long ago, and he is trying to build the long-sought South American economic unit. What worries many observers, including some members of our State Department, is the possibility that Peron may be marching his country down the road to totalitarianism.

Certainly a new factor has appeared in Latin-American politics. Dictators and liberators have succeeded one another interminably, but never before has there been anything to reckon with like the Communist Party. The Communists are trying to give the great uneducated masses of Latin America a sense of power; they are trying to awaken in people both the desire and the willingness to take control of their own destinies.

That any such movement will be rigidly directed in accordance with the aims of U.S.S.R. dictatorship is not recognized by any but the party leaders, nor would it trouble the rank and file greatly if it were. People who are targets of the Communist organizing drives have been exploited for so long by their own succession of dictatorial governments that they are not impressed by scare stories about possible Soviet domination.

However, few people believe Communism will be a serious threat in Latin America unless it is ignored. Communist activity has already had the effect of stirring up a political consciousness among the public at large, both in support of its aims and in opposition. This is all to the good. Real progress in a nation can be founded only upon an educated, informed, and alert public opinion, and by keeping the political pot boiling, the Communists are helping to develop public opinion in Latin America.

In Latin America, as everywhere, the best anti-Communist weapons are education and improved living standards, and American mining companies and manufacturers can help a lot in wielding those weapons effectively. But the important thing to note here is the growing restlessness in the countries I visited, the awakening consciousness in people of the existence of a better plane of life to which their own efforts can carry them. Any planning by outsiders in regard to these countries is unrealistic from now on if it ignores their growing self-assertiveness.

All in all, the present situation is unfavorable to the establishment in the countries I saw of any new foreign-financed enterprises in which Latins do not actively participate. The degree of participation by Latin Americans may be modified by negotiation, but it is unlikely to be eliminated.

Attitude on Foreign Capital

Older companies, long established in Latin America, face this hard fact, too. Peron put it bluntly in a recent speech when he shouted that his administration would not be satisfied until there was not one square inch of Argentine soil, nor one cubic inch of Argentine air, that was not owned by Argentine people. Shortly thereafter, Argentina bought the British-owned Argentine railway system.

In Spain, for example, foreign capital is welcomed, but the Franco Government, through the *Instituto Nacional de la Industria,* must be allowed to purchase 51% of the stock and control one-third of the directorships. Latin America may not go that far, but it is pointed that way.

As a result of inflation, the demands of labor, and the encroachments of governments, mines in Latin America have ceased to be those "low-cost foreign producers" so often referred to in local arguments over tariffs. Most of them are now approaching a "high-cost" status. Consider one of the big copper companies in Chile. The aver-

FREE ENTERPRISER in Bolivia ekes out living by hand-sorting tin concentrate, product of hand-jigging operation. Family groups live on Cerro Rico (Rich Hill), above Potosi, mine and mill by primitive methods, sell concentrate through local mining company. Despite apparent poverty of method, they appear better off in some ways than many daily-wage miners.

age wage this company pays now runs around $6 (U.S.) per day, and supplies cost a lot more in Chile than they do in the United States.

This does not mean, however, that each employee of the company gets $6 or more. The men get only around $4 in direct wages, and the difference in cost to the company lies in the artificial exchange rate, the "store loss," and other benefits to workers.

To meet payrolls and buy supplies the three Chilean copper companies take the dollars they get for their copper and buy pesos at a fixed rate of 19.37 pesos to the dollar. But the actual exchange rate is about 38 pesos to the dollar, and this artificial rate takes a big cut of the company's earnings.

Next, comes the company store. In at least two large companies, prices of food in the company stores have been held to prewar levels, although the cost to the company has climbed several times higher than the selling price. The result is a huge store loss that at one mine runs about $300,000 per month. Furthermore, to hinder black marketing, the companies have to ration these low-priced goods to their employees, which means that the size of each man's ration ticket is now just another topic for union negotiation.

In addition, the copper companies pay all sorts of taxes and benefits of various kinds. For example, when the price of copper goes above 10¢ per pound, the Government gets all of the first 1½¢ and half of every cent increase thereafter. With copper now selling at 23¢, the Chilean Government gets 7.15¢ per pound as a sort of excess-profit levy, not counting other imposts. It is estimated that, barring accidents, Chile will get in 1947 a total of about $115,000,000 in one way or another from the three American copper companies.

The Real Danger

The real danger to all concerned that is inherent in the situation outlined is not that South American governments may be planning to expropriate foreign-owned enterprises. In most cases they simply want to go as far as they can in taxation and actual participation without taking the final step that would drive foreign capital out of the country. Eventually, some foreign owners might be bought out, like the British railway owners in Argentina, but they are not likely to be thrown out.

The danger is simply that the burden of heavy taxes and exchange controls, of discriminatory government regulations, and of labor union harassment, may cause new enterprise to refuse to come in. One could cite several examples of companies that have recently decided against large-scale investment in Latin America, or are taking a long time to weigh the circumstances. One planned operation in the mining field would require an investment of $90,000,000. No company will put that much money into a venture unless it is assured of control of the enterprise and at least a fighting chance of earning a profit.

One can also cite examples of large-scale investments that *are* being made in Latin America.

One alleviating trend is the urge for industrialization mentioned previously. If home-owned industries were developed in a country which is now preoccupied with a very few foreign-owned mines as its chief source of income, much of the burden now borne by such mining companies might be relieved.

Role of Government

Obviously, our Government could help our mining companies a great deal in their attempts to set up working agreements with foreign governments that are equitable and fair to both parties. It is true that our Government does try to help, but its efforts are largely ineffective because, as *E.&M.J.* has pointed out, we do not have, either in Government or in industry, a coherent, well-planned foreign mineral policy, and because our State Department is lackadaisical about supporting American foreign interests when they are persecuted.

Furthermore, until our Government can with a clear conscience bring itself to treat business equitably at home, it is unlikely to be very effective in helping American business abroad. Probably, what will happen for some years at least is that there will be more and more of the "mixed company" sort of thing between private capital and foreign governments.

Close study of the state of mining in South America is a worthwhile occupation for even those mining companies in the United States which have no foreign connections. The obvious reason for this is, as I have indicated, that some foreign governments have entered a lot farther into private enterprise than our own has done, and we can benefit from observing these experiences if the trend in this country should be similar.

In any case, the day is fast approaching for many metals when a choice will have to be made between going abroad to mine high-grade orebodies or staying at home to devise techniques to handle profitably the lower grade, refractory orebodies known in this country, or to undertake the expense of locating deeply hidden deposits. When that time comes, influences such as those discussed in this article will be of utmost importance, and it would be well for us to be familiar with them in advance.

INADEQUATE TRANSPORTATION is holding back much of South America. Most railroads are narrow gage, slow, and overburdened; all of them need new locomotives and rolling stock. Development of industry through improved railroads and other factors would draw government emphasis away from mines, now chief source of income in many countries.

A Survey of Mining Practice

Part IV

A. H. HUBBELL, Managing Editor

Open-pit mining in its various aspects affords as changing a picture as do the underground operations that have been reviewed in the three preceding installments. A scrutiny of drilling and blasting, of digging, and of loading and transport, reveals the alertness and ingenuity of mine operators and of builders of equipment in meeting new difficulties with new procedures and machines.

Acknowledgement is again made of the courteous help received from many mining companies, manufacturers, and individuals who have so freely contributed the data and other information that are brought together in this summary.

CHANGES EFFECTED in open-cut mining practice in the last decade are still in progress. Undertaken to permit recovery of ore in track benches or the continuing of work in pits that were otherwise getting too deep, or in general to meet higher costs or lower ore grades, they have, in the ferrous and nonferrous fields, involved largely the substitution of varying combinations of conveyors and heavy-duty trucks, or trucks alone, for the older railroad-type haulage and transport. In their current aspects, they exhibit a tendency toward bigger and bigger trucks, toward longer and stronger conveyor belts, and possibly to bigger excavators, as will be shown.

Where ground must be broken before digging, efforts have been made to lower the cost of blast holes per ton broken, including experimental work with churn drills, rock drills, and the recently announced novel fusion-piercing.

In open-cut phosphate mining, changes in practice have been of a different sort: There the older procedure of mining the phosphate-bearing stratum hydraulically, following stripping by mechanical means[1] has yielded largely to dry mining by dragline, though once the phosphate is deposited on the bank by the excavator, it is sluiced hydraulically to the washer as in the past. Dry mining, or machine mining, reduces the number of men required in the pit by 50% or more, makes it easier to mine selectively, and obviates the contamination and losses caused by blasting suction wells and ditches.

[1] Formerly both stripping and mining were done hydraulically.

Diverse Efforts Mark Blast-Hole Drilling

Larger Churn-Drill Holes. The trend is toward holes larger than 9 in. in diameter. Experiments made in this direction at a Southwestern copper mine in an attempt to reduce drilling footage by using wider spacing with accompanying better distribution of powder, show a 40% saving of the former drilling footage, with blasting results remaining good. Present tests indicate that a 42-T (Bucyrus-Erie) machine using a heavier stem can drill a 12-in. hole as fast as, if not faster than, a model 29-T is able to drill a hole 9 in. in diameter.

Experimental drilling of 10-in., 11-in. (Wisconsin and Montana), and 12-in. holes (Pennsylvania) is also reported.

Time savings up to 15% in leveling churn drills can now be made by using built-in jacks, each operating a spud, which obviates all need of cribbing and blocking, and which can be worked by valves at the operator's position, according to Bucyrus-Erie, whose largest (42-T) model may be had with them. A steel operator's cab on the same drill is said to promote improved drilling efficiency in severe weather.

Increased use is being made of the horizontal auger-type drill, such as the Parmanco, employed for drilling horizontal toe holes into the bank ahead of the shovels. Every major mine in the Iron Country is said to have one or more of them. Adoption of the mechanical self-feed has speeded up this type of drilling, giving further reduction in cost. This auger drill is being made also in a vertical type and is being used by a large iron-mining company for testing ahead of shovels and for grading. The vertical type is also being employed in drilling and blasting frozen overburden in stripping.

Experiments With Rock Drills. Departing from the idea of churn drilling, a prominent rock-drill manufacturer is working with the problem of using an air-operated piston drill for drilling open-cut blast holes in a hard, tough formation, believing that its slower, more powerful blow will be more effective than that of the faster, lighter hammer drill.

Fusion-Piercing Tested on Mesabi Taconite

Novel Substitute for Drilling. Radical departure from orthodox methods for making holes in rock was recently demonstrated when Linde Air Products Co., after long development, used its fusion-piercing process (described in Nov. 1946 *E.&M.J.* by A. W. Knoerr) to produce 6-in. vertical blast holes 30 ft. deep in hard taconite on the Eastern Mesabi, scoring an average penetration rate of 10 ft. per hour as against 1 ft. with churn drills. The blowpipe employed "pierces" the rock ahead of it by means of temperatures as high as 4,000 deg. F. produced by burning oxygen with a petroleum-base fuel, which also carries a flux, the resulting granulated rock gases, and vapor being ejected by the pressure developed. The industry awaits further facts.

What tungsten carbide, in some form of percussion or rotary bit,

Some Heavy-Duty Truck Fleets in Current Mining

Company	Trucks	
Republic Steel, Minnesota	15	15-ton diesel-driven end-dump
Utah Construction Co. (Utah Copper mine)	6	20-ton diesel-driven bottom-dump
	1	20-ton diesel-driven end-dump
M. A. Hanna, Minnesota	61	15-ton diesel-driven end-dump
	40	20-ton diesel-driven end-dump
Cleveland-Cliffs Iron Co.	22	15-ton diesel-driven end-dump
Minnesota	26	20-ton diesel-driven end-dump
Butler Brothers	18	15-ton diesel-driven end-dump
Minnesota	25	20-ton diesel-driven end-dump
Snyder Mining Co.	6	20-ton, butane, end-dump
Minnesota	5	30-ton, butane, side-dump
Cananea Cons., Mexico	25	30-ton, diesel-driven, end-dump

Company	Trucks	
Iron Mining Company	86	15-ton butane, 81; diesel, 12
Minnesota	7	20-ton end-dump, 86; bottom-dump, 7
Jones & Laughlin, New York	10	30-ton, diesel, side-dump
International Nickel, Canada	33	21-cu. yd., diesel, end-dump
Morenci, Arizona		22½-cu. yd.
Katanga, Belgian Congo		20-ton, diesel, end-dump
Bradley Mining Co., Idaho	12	15-ton, diesel, end-dump
	3	30-ton, diesel, bottom-dump
Charleson Mining Co., Minnesota	7	15-ton, diesel, end-dump
Rhude & Fryberger, Minnesota	10	15-ton, diesel, end-dump
	5	20-ton, diesel, end-dump

can do in drilling this hard formation remains to be seen.

Utah's Drilling Practice. Present status of drilling and blasting practice at Kennecott's Utah mine, as described by R. H. Willey at the A.I.M.E.'s recent New York meeting, shows marked improvement in recent years. Cubic yards per drilling-and-blasting manshift were 742.5 in 1946; 368.9 in 1937. Footage drilled per 1000 cu.yd. was 20 in 1946; 33.6 in 1937. Factors responsible include: recent substitution of wagon drills drilling vertical holes for tripod-mounted auto-feed machines drilling bank holes; use of improved spacing, better explosives, and heavier charges; group-hole blasting with Primacord; newer type shovels; and use of mechanical means, such as bulldozers, for uncovering buried holes.

Improved blasting results (increased overbreak with good fragmentation and less likelihood of throwing) have been obtained by Utah in recent months by using a powerful but slow free-flowing high-ammonia powder (Hercomite Bag) in all vertical holes save wet ones. Previously a fast-action powder had been thought best.

A free-running ammonia powder of much greater strength and speed than formerly is being used at a mine in the Southwest. Fragmentation is better and the heave has been reduced to the point where load tracks 60 ft. from a 50-ft. bank can be left in place when it is being blasted, whereas formerly they had to be moved.

Larger Draglines Finding Current Application

The "Bigger Digger." Whether the big new Bucyrus electric walking dragline, nicknamed the "Bigger Digger," with its 21.4-cu.yd. bucket and 215-ft. boom, which International Minerals & Chemical Corporation has been operating in the Florida phosphate field for 16 months, is a forerunner of bigger excavators in general for the non-metal- and metal-mining industries remains to be seen. The same company, at its new Noralyn mine, is putting in a new 16-cu.yd. walking dragline, of the same make, with a 175-ft. boom, and the American Cyanamid Co., in the same area, has recently finished erecting a similar machine. In this district up to two or three years ago an 8½- to 10-cu.yd. bucket was considered big. Present ideal size seems to range from 12 to 16 cu.yd., with booms 175 to 215 ft. long. Deposit conditions determine the sizes of bucket and boom.

In the Tennessee phosphate field the conditions are different and the trend has been toward larger machines for stripping—that is, up to a 4-cu.yd. bucket and a 125-ft. boom, and to small machines for loading, in this case to a ¾- to 1½-cu.yd. bucket and a 40- to 60-ft. boom.

On the Mesabi iron range the counterpart of the 21.4-cu.yd. "Bigger Digger," first mentioned, is on order for stripping overburden in a scheme that involves use of conveyors for taking the spoil to the dump.

Cost of Trucking Ore at Castle Dome, 1944 *

	30-Ton Truck	15-Ton Truck
Ton-Miles Hauled	1,014,920	256,432
Operating labor	$0.02199	$0.04792
Repair labor	0.01452	0.01441
Operating supplies	0.00028	0.00008
Petroleum products	0.00536	0.01044
Tires and tubes	0.01943	0.01045
Repair supplies	0.01585	0.01189
Road maintenance	0.00995	0.00995
Total	$0.08738	$0.10514

*B. R. Coil, General Superintendent, Miami Copper Co., American Mining Congress Convention, Denver, Sept. 9–12, 1946.

Whether all these instances are part of a trend in size is, as already stated, still an open question. However, so far as type of mounting is concerned, a definite trend from the caterpillar-mounted dragline to the walking type may be said to have been established.

Aside from the big new draglines just mentioned and their electronic operating control and protective structure-stress alarm systems, the various lines of excavator equipment appear to offer nothing novel. Manufacturers have developed new shovels and draglines, but in practically all cases these follow conventional designs and sizes within the usual ranges, thus being modernized types rather than new ones.

Excavator Controls Find Favor

The new excavator controls are finding increasing use. To cite an example, either the amplidyne or the Rototrol system (which are refinements that permit more rapid response to changing conditions of operation) is now standard on the 6-cu.yd. Marion Type 151-M shovel and on all larger units of this make, and may be had on the 5-cu.yd. Type 4161 excavator if wanted. The P.&H. Magnetorque uses electromagnetic forces to transmit power for swinging, giving cushioned acceleration and deceleration, and makes swing clutches unnecessary.

Shovel dippers, at both Iron Country and porphyry copper operations, are still largely within the 4- to 6½-cu.yd. capacity range. Dipper size should bear a proper relation to the size of car or truck to be loaded. The huge shovels used in coal stripping are not found in mining outside the coal industry.

Introduction of very large drag-

lines and shovels has required cooperation from wire-rope manufacturers in providing larger and stronger ropes. The largest rope diameter on the "Bigger Digger" is 2¼ in. Some ropes used today are as large as 3⅛ in. in diameter (according to A. Leschen & Sons company) which would have been unusual a few years ago.

The Tractor-Scraper. Use of tractor-drawn rubber-tired-wheeled scrapers in mining work is noted in connection with certain placer operations; in stripping some nonmetallic deposits; in small stripping jobs in the Iron Country with limited length of haul (for a roughly estimated total yardage of two million yards in the last five years); in minor clean-up jobs around large open-cut mines; and in miscellaneous earth-moving jobs including construction of dikes for tailings basins. Much drift and other overburden contains too much rock for efficient use of such equipment. According to an Iron Country engineer, where conditions *do* permit, these scrapers can move stripping for about 60% of the cost of using power shovels and trucks.

Trucks and Conveyors Still in Spotlight

Transport Means Varied. Railroad-type haulage continues strongly entrenched where daily tonnage is large and haulage distance is great, especially if the reserves remaining are of considerable size, the amount left in track benches gives no concern for the present, and the locomotives and cars have long been installed and possibly written off. Under these conditions of large-scale operation the resulting haulage cost per ton cannot be bettered. Eventually, as tonnage dwindles, such mines will use trucks or conveyors or both.

One iron mining company, already using large diesel-electric locomotives (also steam units) on steepening open-pit grades, is adding four 1500-hp. units. They offer lower operating cost, higher availability, greater traction. In some places where railroad-type haulage is used, electric tie tampers and panel, or sectionalized, track have helped save labor.

Haulage with heavy-duty trucks is still in its heyday. Trucks will figure in practically every new mine or reopened pit. The recently new Castle Dome pit in Arizona, with 29 million tons of 0.741% copper ore, is equipped with trucks exclusively (13 30-ton Knuckey and four 15-ton Euclid units). Extensive use of trucks in small irregular pits elsewhere is reported. They do best with short hauls, moderate grades (up to 10%) with transfer to a conveyor system to take the ore out of the pit if circumstances justify.

Greatest Use of Trucks in Iron Country

In the Iron Country, where the heavy-duty truck was pioneered, truck haulage has been highly successful where conditions were suitable. More than 700 heavy-duty trucks in service are reported—a 10 years' growth—and 58% of the 116,013,000 tons of ore and stripping handled on the Mesabi in 1945 was moved in trucks.

Cost of trucking ore per ton-mile at the Castle Dome pit early in 1944 was $0.08738 for 1,014,920 ton miles with the 30-ton truck, and $0.10514 for 256,432 ton-miles with the 15-ton truck, as stated by B. R. Coil, general superintendent for Miami Copper, at the Denver meeting of the American Mining Congress last September. These costs are broken down in the accompanying table.

Truck Size Increases. Euclid Road Machinery Co. on March 20 announced completion of a 40-ton (80,000-lb.) capacity truck, which it believes is the largest built, with the load "on its back." The new unit, in experimental use at a Mesabi property of the M. A. Hanna Co., is powered by a 12-cylinder 550-hp. supercharged Cummins diesel engine. Gross weight with capacity payload is 80 tons. Ten 5½-ft. diameter tires carry the truck, the two front ones being 18:00x24 and the others 16:00x32. See page 98.

In comparison, most of the trucks in Iron Country service have been of 15 tons' (30,000 lb.) capacity. The transition between the two sizes, which has been promoted over several years by labor shortage and need for maintaining tonnage, is represented by a varying number of 40,000 to 44,000-lb. and 60,000-lb. (and some even larger) units in service with various operators. In particular the Euclid company, which has supplied a large part of the 15-ton trucks mentioned, is finding that its 44,000-lb. rear-dump unit, which was introduced about three years ago, is rapidly replacing the earlier model. It cannot be said, however, that the trend in truck size is uniformly upward to the largest size. To illustrate, one important company, whose fleet already included nine Euclid and nine Mack trucks, all of 60,000-lb. payload capacity, has recently ordered 17 44,000-lb. capacity Euclids, each having a 275-hp. Cummins diesel engine. For several years the Webb mine, on the Mesabi, has been using Walter trucks, having at present three of 54,000-lb. capacity and four of 64,000-lb. Another operator has limited its choice in trucks to units of Dart make, mostly of 30,000-lb. capacity, but recently acquiring a few of 40,000-lb.

Trail trucks of 35-ton and larger capacity are in production or under development by various manufacturers, the idea being that the smaller truck and the trailer will cost less to replace.

The accompanying tabulation of miscellaneous truck fleets will help round out the picture of the current situation.

Will the Belt Conveyor Displace the Truck?

Trucks vs. Conveyors. While trucks alone are found in some medium-size pits, as at Castle Dome, and in general at small open-cut operations, the trend in larger-scale work has been toward their use with conveyors in suitable combinations. Such a combination gives a lower operating and maintenance cost with less rubber consumption per ton than an equivalent installation consisting of trucks alone.

Provided the material to be carried can be handled by a belt, the conveyor gives cheap transport. A comparison of (1943) costs obtained by one iron ore operator was 16 mills per ton for conveying the ore out of the pit against 53 mills for trucking it out. At another operation in the same year, the cost of trucking in the pit was 70 mills per ton when handling 1,000,000 tons per year.

The Maintenance Problem

Truck maintenance has become a tremendous task on the Mesabi, according to an Iron Country engineer, and almost every company has its separate maintenance unit

for this purpose, divorced from ordinary shop work. The commentator cited expects to see more belt conveyors and fewer trucks, the latter being used only as gathering units on very short hauls. Road construction and maintenance should also be reduced.

Possible New Technique in Stripping

Problems of waste disposal in stripping are receiving attention from various Mesabi operators, and developments are expected. One idea is to use a dragline or a pendulum conveyor to load or carry the spoil to the main conveyor, and to use special stackers at the waste pile. To this end, one operator has on order a duplicate of the 21.4-cu.yd. Bucyrus dragline now working in the Florida pebble phosphate field, it being planned that this will deliver to a screening plant to remove the coarse rock, the undersize then going by 48-in. conveyors to the stacker.

Conveyor systems installed in Mesabi pits (see *Skillings Mining Review,* Nov.9,1946) number 12 today, compared with one in 1936. With one more on the Cuyuna, the 13 total 20,000 ft. of conveyor, the lift ranging from 86 to 428 ft. to the pit edge, this in one to four stages, save in the Spruce pit, where 9 stages are employed. Slopes vary from 10 deg. to 19 deg., capacities from 250 to 1,200 gross tons per hour, and belt speeds from 390 to 550 f.p.m.

Manufacturers have been trying to improve belt construction to permit great uninterrupted belt lengths and high lifts, as by using steel-cord reinforcement. Thanks to such efforts, four of the installations consist of a single conveyor ranging in length from 946 ft. to 1,750 ft. between centers, the four respective lifts being 260 to 550 ft. Thus in these four cases the number of transfer points are reduced, with lessened resultant wear and fewer drives. Plans for an Alabama coal mine include installing a belt conveyor in five sections with a total lift of 715 ft. Introduction of a new conveyor belt 250 to 400% stronger than previous rubber-fabric belts is announced.

A fluid-drive features the 1,750-ft. single-lift conveyor just mentioned. This novelty is at the Portsmouth mine, the sole Cuyuna installation and the newest of the 13 listed in second paragraph above.

Parts I, II, and III of this Survey, published in the February, March and April issues respectively, dealt with underground operations including drilling, blasting, loading, haulage and transport, hoisting, air conditioning and ventilation, pumping, mine communications and core recovery in exploration drilling. Attention is now directed to certain remaining aspects of underground work.

Boring of Big Holes on Increase

Shot Drilling Tends Toward Bigger Sizes. For several years the mining industry has been able to point to three large boreholes of 5 to 5½ ft. in diameter, one put down by Idaho-Maryland Mines Co. in California and two by Pickands, Mather & Co. in the Iron Country, in all of which the operator rode the shot-drilling tool with its driving motor down the hole, a core being taken in all cases. Today even larger sizes are contemplated. Reporting good progress with a 6-ft. diameter hole that is currently being drilled in Peru with one of its Calyx drills, Ingersoll-Rand quotes its fieldman's opinion that a 10-ft. hole should be easier than even one of 36-in. diameter. During the war this company supplied many 36-in. and 48-in. drills to the U. S. Government. A few years ago the Soviet Government acquired two 72-in. Calyx drills.

Applications include: construction of ore passes, pilot holes for sinking compartment shafts of large diameter, and ventilation holes from surface down to mine workings.

Average cutting speed does not decrease materially as size increases. In many cases, there is little difference between a 48-in. and a 72-in. machine. Eight to 10 in. per minute is a fair estimate in granite, 12 to 15 in. in a coarse-grained formation.

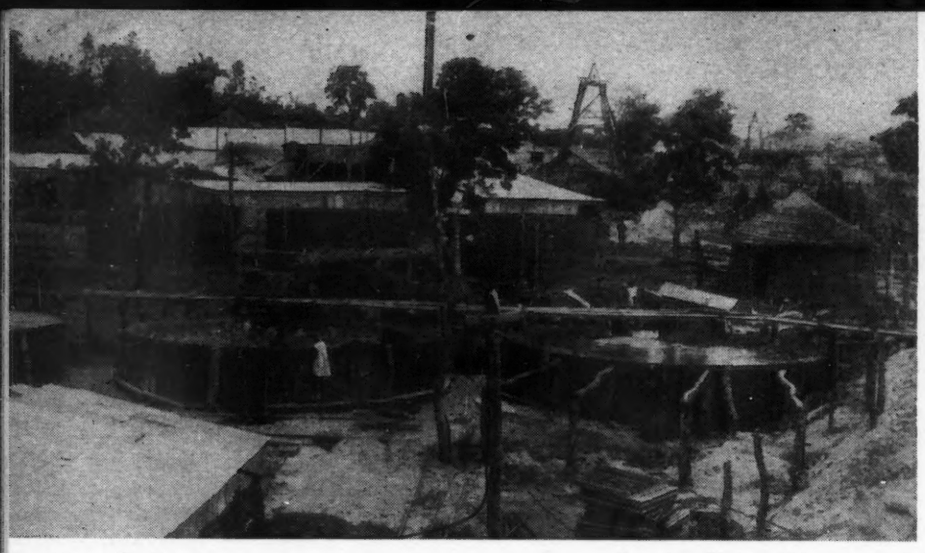
Churn Drills for Big Holes. According to one engineer, use of churn drills for making holes large enough for a man to enter has been a major recent development in shaft sinking, the work being done mostly by contractors, who have their own equipment. Sinking of a 48-in. diameter shaft in the Iron Country to 1005 ft., using cable tools for the initial 12-in. hole followed by reaming to 30 in. and 48 in. successively, was described by E. J. Rogers, of Layne-Northwest Co. in *E. & M. J.*,Vol.145,No.9. J. B. Newsom, San Francisco engineer, claims it is easy to enlarge a hole thus drilled to any desired size and shape, whether or not there is an opening at the bottom. This witness has patented a procedure for doing this, at same time believing there are other suitable methods.

The Bucket Drill. Application of the rotary bucket drill (previously used for digging cesspools, sinking caissons and construction footing and similar work) to exploration for quicksilver in California, soft iron ore in Oregon and Missouri, and low-grade manganese in South Dakota, has been reported by P. E. Pesonen, of U. S. Bureau of Mines. As used on manganese in South Dakota, this drill had 24-in. and 30-in. diameter buckets and an 18-in. diameter core barrel, these being rotated at about 7 r.p.m. by a 6-hp. gas engine from a 24-ft. collapsible derrick. The manganese drilled consisted of irregularly distributed flat, oval concretions 3 to 10 in. thick, 3 to 28 in. in diameter, averaging 4 by 5 in., and of about 5½ hardness (Moh's scale). To allow for swell, the maximum drilling interval was 1 ft. for a 3-ft. bucket height. Over 14,000 ft. of 24-in. holes, of 124 ft. maximum depth and 59.6 ft. average depth, was drilled in 3159 hours of actual digging and pulling (plus 260 hours approximately for moving). Average drilling progress was 4.14 ft. per hour of drilling and moving time. Drilling cost ranged from $1.05 to $8.00 per foot, averaged $1.90. Average contractual cost for drilling and moving was $2.05 per foot. An advantage claimed for mineral exploration is that a man can be lowered down the hole.

A Bit of Practice Taken From the Oil Field

A Rotary Rig and Reamer. Use of an oil-field-type rotary drilling rig and derrick in the Arkansas bauxite field for drilling large-diameter holes in water-saturated unconsolidated sands and clays has been described in the Bureau's Information Circular 7336. Following the drilling of a 24-in. pilot hole with a 4-edged cutting bit, reaming was done with a hard-surfaced bit 7 ft. in diameter, 20 ft. long and of 7,000 lb. weight, developed by the Layne-Arkansas Co. Costs were not available but are said to be variable for this sort of work.

Shaft sinking and mining methods will be dealt with in a remaining installment.



NANGODI GOLD MINE, in West Africa, had to supply its equipment needs by improvisation and catch-as-catch-can, owing both to shortage of capital and to wartime supply difficulties. Shown here are the headframe, the mill buildings, and some of the cyanide leaching tanks, which were charged from cars run out on the trestle alongside. The unevenness of these tracks often resulted in unintentional dumping of both load and car into the tanks.

Milling on a Shoestring On the African Gold Coast

W. H. DENNIS, Ilford, Essex, England

WE BEGAN MILLING at Nangodi in true bush fashion. When we had a stockpile of ore from the brand new shaft, a score or so of native women squatted in a circle and pounded up the quartz in iron pestles, feeding it thereafter to a five-stamp prospector's battery and an amalgamation plate. After all, the mine lies back in the Northern Territory of the African Gold Coast, 400 miles from a railroad and 600 miles from a seaport. Equipment was always hard to get, and during the recent war the supply was doubly difficult.

The Nangodi gold orebody was discovered in 1934 by the present owner and his partner, largely aided by a deaf-and-dumb native, whom they rewarded by a gift of five cows. Knowing a good thing when he saw it, Dum Dum, the native, abandoned mining, traded part of his capital for a couple of wives and a plot of ground, and became a gentleman farmer.

Equipping the new mine took capital of another sort, however, and having begun on the familiar shoestring, we had to take our machines where we found them, which meant, for the most part, out in the Gold Coast jungle. Assisted by a bottle or two of trade gin, we could get many a local chief to show us the way to some derelict and forgotten mine, or to the parts of some machine strung along a trail where native bearers had abandoned them years ago. Ingenuity plus a good welder did the rest. In 1941, for example, we dug out of the bush nearly two miles of 18-in. pipe complete with valves, a very scarce item at the time, which we sold outright to a Nigerian tin mine for $15,000. It was hard graft at that, because the price included wrestling the pipe down to the seacoast in the rainy season.

Amalgamation First

We eventually expanded our plant by means of two old ball mills and other finds until we could treat 80 tons a day by the flowsheet shown herewith, although cyanidation was not added for several years. "We" refers to: the manager, who supervised the mine; myself, who ran the mill; a shift boss, who was an ex-professional elephant hunter; and 600 natives, a happy-go-lucky lot, who lived pretty much as nature made them.

Power was supplied by an old producer-gas engine combination we got second-hand. At first we tried elephant grass as fuel for the producer, but we couldn't cram the grass in fast enough. Millet, the grain used locally for food, came next and proved satisfactory. The stuff has a stem as thick as a man's wrist and grows 14 ft. high. It worked well in the gas producer and also in a small boiler we later acquired, although it did scale up the tubes rather badly.

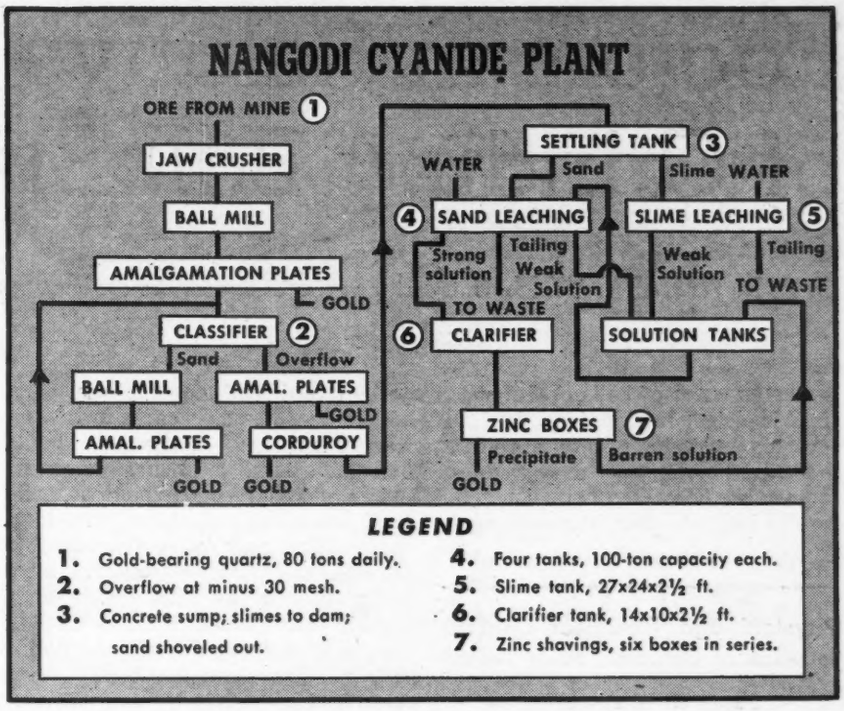
At first our only gold recovery was by amalgamation, with which process 30% of the gold in the ore was caught on plates under the ball-mill discharges, 50% on the large plates below the classifier, and 20% went on with the tailings to be stacked. We later began making a pyrite concentrate on corduroy, and also began separating the tailings into sands and slimes, which were stacked separately.

We cleaned the plates twice daily by standard methods, and the bars we cast ran 935 fine. Occasionally we hit a rich pocket in the mine and then the ball-mill plates had to be cleaned up every three hours or so. Once we hit a bonanza and cleaned up 300 oz. in 20 hours, which called for champagne all around.

Speaking of bonanzas, I shall never forget the priest at a nearby native mission who once mentioned

casually that he thought he had "some of that gold ore," too. He found it on a dusty shelf, a heavy piece of quartz-bearing gold about the size of a matchbox. It had been given the good father by a native two or three years previously, and he remembered the boy's name but not his whereabouts. Of course we sent a gang out looking for the boy or his bonanza, but we never found either.

In about six years we had collected around 25,000 tons of sand tailings and 15,000 tons of slime, the former running about $5.60 a ton and the latter, $4.50. Cyanide leaching being most appropriate to treat this accumulation, we set about building a cyanide plant. For once local sources failed us, and we had to buy plate from England to make four 100-ton sand-leaching tanks and three solution tanks. After we had manhandled the tanks into place, we built a track alongside them so that carloads of sand could be dumped into them. In the early stages of that work, the cars, as often as not, went right on into the tanks along with the tailings.



Cyanidation Later

We made our 0.05% cyanide solution by putting a weighed amount of cyanide into a perforated drum, submerging the drum in the solution tank, and then blowing in air to agitate the solution. Upward percolation proved best for sand leaching, a 20-hour contact being required to dissolve the gold. A weak-solution wash and two water washes were used.

We precipitated gold with zinc shavings, and found three things to be essential for good recovery: (1) The pregnant solution had to be clarified for good precipitation; (2) Careful, systematic packing of the zinc shavings was essential; (3) The pregnant solution had to be deoxidized before precipitation, which we did by running the solution over clean iron shavings.

Once a month, on the first, we cleaned up the zinc boxes, removing the zinc in the first three boxes in turn, and washing off the gold slime through a screen into a tub. We moved zinc on up the line of six boxes to replace any shortages, and added fresh zinc only to the last box. We let the gold precipitate drain overnight in a calico bag, dried it next day on an iron pan, and smelted it with soda ash and borax in salamander crucibles. Running down a hundredweight of precipitate took about seven hours. Bullion ran about 780 fine.

All we had available for slime treatment was a 12x12-ft. agitator, which we tried out as follows: We filled the agitator with 0.06% KCN solution, started the mechanism, then had the natives dump in slime and lime. After awhile we stopped the agitator and waited for the solids to settle. We waited, in fact, for three days, and even then had only four feet of clear liquid to show for it. Recovery turned out to be about 40%, so we tried another way.

After some experiment, we devised a satisfactory means of coping with the slime by mixing sand with it before leaching. Tanks for this purpose were broad and shallow. Built of diesel oil drums, cut lengthwise and rolled out flat, these sand-slime tanks were 27x24x2½ ft. in size. Filter medium in these tanks was our standard combination of broken quartz, old cocoa sacks, and clean sand. Sand and slime were mixed in a makeshift tumbling barrel made of a piece of shafting and old oil drums. At first run by hand, this mixer was eventually mechanized. We were able to use upward percolation, and in general we followed the same procedure as for sand leaching. The whole cycle from charging to emptying took 4½ days. Recovery of gold from slimes went from 40% up to 65%. We tried applying a vacuum to the leach tanks with a converted compressor, but it did not speed up percolation rate.

Our assay office was built of oil drum sheeting lined with the laterite-cow-dung mixture used as building material by the natives.

This insulation and the millet-thatch roof kept out some of the sun's heat. Our improvised fusion furnace could run down 8 to 10 samples an hour with a fuel consumption (diesel oil) of 2½ to 3 gal. per hour. We ran cupellations in a prospecting furnace. The approximate cost per assay was $0.30.

Living at the camp was not too bad. The houses were built of the native clay and had thatched roofs. Furniture was homemade. Food came from tins, unless someone brought in a bush turkey or a wild pig. The country is open and comparatively densely populated, and game is scarce.

From January to April, it never rains and the shade temperature can hit 116 deg. or more. My dry-season outfit consisted solely of helmet, shorts, and sand shoes, any more clothing in that furnace-like heat being intolerable. Once the rains began in May, however, patches of green millet appeared and things were more cheerful. Of course the mosquitoes were always bad, even during the day, so that even the midday siesta had to be taken under the net. But, take it by and large, working on a shoestring in West Africa can be quite educational and even stimulating, if one does a good maintenance job on his sense of humor.

Factors in Relative Wear of Grinding Ball Sizes

O. E. B. TIMMERMANS, University of the Witwatersrand, Johannesburg, South Africa.

RELATIVE WEAR of balls of different sizes in a ball mill is dependent on several operating factors. Tests to study the effect of some of these factors are described herewith. The results indicate that increased fineness of feed tends to equalize wear, and that total ball wear seems less when the sets of large and small balls have equal total surface areas.

For a strict comparison of ball wear among various sizes, chemical composition and microstructure of all sizes ought to be similar. Data are given for the balls tested, and certain differences will be noted. The figures for reduction in diameter of large and small balls are not therefore strictly comparable; yet the reductions noted for each size considered separately may be studied profitably.

Test 1. In the first test, three mills were run under identical conditions except that feed size was varied among the three. Results indicate that at some given feed, reduction in diameter of large and small balls would be equal. Reduction in diameter of large balls decreases, and that of small balls increases, as feed became finer.

Averaging surface areas before and after each of the three tests, one finds that when equal weights of large and small balls are used, ratio between average surface area of a large ball and a small one is 3.245:1. Ratio between loss in weight of large and small balls is 3.246 : 1. Under the conditions stated, average ball wear in a mixed load is proportional to surface area per unit ball.

Test 2. Next the feed size was kept constant, as was total weight of grinding balls, but proportion of large to small balls was different in each mill.

As compared with Test 2, reduc-

Physical and Chemical Characteristics of Grinding Balls Tested

Partial chemical analysis

	Large Balls, %	Small Balls, %
Carbon	0.840	0.832
Sulphur	0.026	0.027
Phosphorus	0.064	0.059
Manganese	0.385	0.331
Silicon	0.096	0.107

Hardness, Rockwell C. Large balls, 63; small balls 42.

Microstructure:

The large balls were found to consist of a slightly tempered martensite. They were uniform and no decarburization was found.

Structure of the small balls was not uniform, consisting of nodules of troostite and white-etching martensite, varying in quantity. Pearlite was found in a few specimens. A decarburized outer skin explains the lower hardness of the small balls.

Test 3. One test in which mill was run at 55% of critical speed, as against 64% in all previous tests. Mill also 9.6 in. interior diameter, against 7.0 in. for previous tests.

Size of feed, Tyler scale	96%–10+48
Moisture in feed, percent	35
Number of large balls	44
Number of small balls	218
Reduction in ball diameter, cm.	
Large balls	0.0060
Small balls	0.0068
Total ball wear, grams	
Large balls	52.69
Small balls	89.93
Relative surface, large to small	2.92:1
Relative wear, large to small	2.662:1

Test 1. Three tests run with increasing fineness of feed

	Mill 1	Mill 2	Mill 3
Size of feed, Tyler scale	98%–3+20	96%–10+48	82%–28+150
Moisture in feed, percent	30	35	40
Ratio of surface, large to small	1:1.71	1:1.71	1:1.71
Ratio of volume, large to small	1:1	1:1	1:1
Reduction in ball diameter, cm.			
Large balls	0.0084	0.0084	0.0078
Small balls	0.0072	0.0074	0.0076
Total wear of balls, grams			
Large balls	63.61	63.91	60.24
Small balls	96.00	95.96	97.82

Charge in each mill included: 44 large balls (3.77 cm. diameter); 218 small balls (2.21 cm. diameter).

Test 2. Three tests in which ratio of large to small balls was varied

	Mill 1	Mill 2	Mill 3
Size of feed, Tyler scale	98%–3+20	98%–3+20	98%–3+20
Moisture in feed, percent	30	30	30
Number of large balls	44	54	64
Number of small balls	218	172	122
Ratio total surface, large to small	1:1.71	1:1.05	1:0.66
Ratio total volume, large to small	1:1	1:0.64	1:0.38
Reduction in ball diameter, cm.			
Large balls	0.0084	0.0073	0.0072
Small balls	0.0072	0.0058	0.0062
Total wear of balls, grams			
Large balls	63.61	69.09	81.79
Small balls	96.00	56.55	44.57

tion in diameter was smaller. Averaging surface areas before and after each of the three tests, one finds the ratio between average surface areas of large and small balls is 2.91:1. Ratio of loss in weight of large and small balls is 3.437:1.

A large ball loses weight somewhat more rapidly than a small one. It would seem that for equal loads, total ball wear is less when two sets of balls have equal total surface areas than when equal volumes of each are present.

Test 3. Using a larger mill, run at 55% of critical speed instead of 64, it was found that total ball wear was less than in Mill 2, Test 1, and that relative wear of large, compared with small, balls was less than the ratio of surface areas. This reversal may be due to less vigorous ball movement and the increase in attritional grinding at the lower mill speed.

Assuming that balls have identical wear-resistant properties, which these did not, one may hazard the opinion that, with equal ball loads, relative wear in normal grinding practice will be a function mainly of relative surface areas of different sizes of ball used. Wear will also be affected by quantities of different sizes used, by weight of individual ball, and by feed size and products of grinding.

Probably wear of small balls, especially near the discharge end of the mill, is affected by the percentage of voids between the ore particles themselves. That is, the more space between balls that is filled by ore particles, the greater will be the ball wear and, in turn, the capacity of the mill. At cataracting speeds, a ball mill has the qualities of both the stamp battery and the rod mill.

Mexico Exempts Old Titles As to Assessment Work

ALBERTO TERRONES BENITEZ, Mining Attorney, Mexico City

As this article is going to press, the author has advised that the decree referred to on page 80, column 2, has been suspended for one year with respect to mines patented before 1926. The author's review of important epochs in the history of Mexican mining law follows:

Spanish Domination. Privileges of ownership by Spaniards and Indians were defined in the first mining laws of the Spanish conquest in 1521. In 1584, ordinances proclaimed that the dominion of all metal mines rested with the Spanish Crown. First forfeiture regulations were proscribed in 1629, when mines which lay idle for more than four months were made subject to denunciation and relocation.

Mining ordinances of 1783 permitted ownership of concessions by private parties and required certain royalty payments to the Crown. Foreigners were not allowed to acquire mines unless they became naturalized citizens. The right to discovery was strongly enforced and mining patents and titles granted real ownership.

Epoch of Independence. Although Mexican independence started in 1821, for lack of better laws the 1783 ordinances prevailed until 1857, when the power to enact mining legislation was transferred to the states. Virtual paralysis of the industry resulted. Consequently, the Federal constitution was amended in 1883 to restore exclusive jurisdiction of mining to the Federal Congress. Under a uniform mining code adopted in 1884 mines were declared to be abandoned and open for relocation if idle for six months.

ALBERTO TERRONES BENITEZ

Depreciation of silver in 1886 led to liberalization of mining laws encouraging exploration and granting tax exemptions. In 1892 a law was enacted under which Mexicans and foreigners were permitted to acquire as many "pertenencias" (hectares, each one 2.47 acres) as desired.

All assessment work was abolished, and all titles issued by the government were irrevocable provided the Federal pertenencia tax was paid.

Diaz Administration and Revolutionary Period. Under a new mining law in 1909 which generally confirmed the non-assessment work features of the 1892 law, foreigners were forbidden to acquire mines within a zone 80 kilometers wide along international borders without special permission.

Under the new constitution enacted in 1917 of the revolutionary period, mining laws were modified as follows: (1) The nation held title to all mineral veins, lodes, and deposits. (2) Only Mexicans by birth or naturalization were qualified to acquire mines; foreigners were allowed the same right only upon waiver of nationality. (3) Regular assessment work was required for patented

claims under the constitution.

Contemporaneous Period. The Law of Mineral Industries of 1926 instituted the following changes: (1) Mining patents were to be forfeited if production fell below a stipulated minimum. (2) Mining patents and concessions granted under previous legislation did not require the issuance of new mining titles unless declared forfeited under previous laws governing their issuance. (3) Pursuant to provisions of the Alien Law of Dec. 30, 1925, foreigners were not allowed to acquire mines within 100 kilometers of the international border or 50 kilometers of the coast.

These principles were upheld in the 1930 mining law and are still in effect. They caused much litigation over the validity of mining concessions granted previous to the 1926 law. The Government cancelled several groups of mining titles, arguing lack of assessment work for important silver-gold mines, and several cases are still on the Supreme Court docket.

In 1946 there were nearly 6,000 mining claims patented prior to the Law of Mineral Industries which were not subject to regular assessment work according to the opinion of the owners. The Government did not concur, however. The remainder of 9,474 claims patented under the laws of 1926 and 1930 reported regular assessment work.

Statistics showing yield of mining claims in terms of metal output per hectare from 1900 to 1944 indicate that the number of idle mining claims has increased remarkably. This is probably due to the intervention of promoters in patenting mining claims, obnoxious legislation, burdensome taxes and to the number of social welfare demands.

The Present Conditions

The foregoing summary demonstrates that, in general, legislation has been deficient in creating and protecting ownership rights on idle mineralized areas. The feeling of "mines for those who work them" has predominated throughout; this is really one feature of the legal "concession system" adopted in Mexico, and it was only through a fiction of the law that mines covered by mining patents were considered as real estate.

The General Law of National Dominion, now in force, classifies mining concessions as falling under the public or eminent domain and states that these concessions or grants do not create any rights of fee-simple ownership. They merely convey unto the patentee the exclusive right to explore, develop, and work the mineral deposits upon the conditions and under the obligations prescribed in the Mining Law and regulations. Monopolization of mineral resources would result in cancellation of mining patents issued to monopolistic enterprises. However, the Government does not consider as a monopoly the holding of extensive areas of low-grade mineral deposits requiring large-scale mining for economical operation and large capital investments with a complex technical and financial organization. This applies to extensive alluvial deposits, whether gold or stream-tin, classified as "national mineral reserves" which through the "Comision de Fomento Minero" have been granted to large-size enterprises under "special contractual agreements" whereby the Government collects a royalty ranging from 2% to 5% of net metal production.

So, the obligation of executing "regular assessment work" and reporting the same to the Government remains as an outstanding feature of mining concessions in order to keep the mining patents alive. For those patents issued prior to the 1926 Law of Mineral Industries, about which a deep disagreement between the mine owners and the Government arose, the discussion came up again early in 1946. Through the intervention of the Mexican Mining Chamber the matter was adjusted, and as a result the President decreed the following regulations:

1. The obligation to report regular mining assessment work executed during 1946 in the mines patented under the mining laws that were in force prior to May 3, 1926, shall become effective on Feb. 11, 1947. (This has been suspended. See opening paragraph).

2. The nature of assessment work and the investments made will be determined by the relevant provisions of the Mining Law and the regulations thereto at present in force, excepting the case of "special contracts" in national mineral reserves where the above-stated obligations shall be governed by the stipulations therein contained.

3. Should the patentee hold or own several mining concessions covering a number of mining claims, he will enjoy the right to have them grouped in the manner and under the terms stated in the regulations whether the mining claims may adjoin each other or lie separate, for the purpose of executing and reporting the assessment work.

Consequently, to avoid forfeiture the owners of some 6,000 mining claims patented according to mining legislation in force prior to May 3, 1926, besides paying up to date the area of "pertenencia" mining taxes, were required to present evidence of the assessment work done during 1946 and of the investment made in salaries and other operating expenses, in the form and for the amount stated in mining regulations now in force.

Limitations to Foreigners

The previously cited alien law of 1925 attempted to limit the acquisition of mineral concessions by foreigners or Mexican mining companies with foreign stockholders, and required a waiver of nationality from parties participating in the acquisition. Further limitations on foreign ownership of concessions were imposed thereafter, culminating in a Presidential decree in 1944 which imposed restrictions upon foreigners acquiring interest and control of commercial companies engaged in industrial production, agriculture, and forestry as well as mining. Under this decree, which became a permanent law, the Secretary of Foreign Relations was given discretionary power to enforce and interpret its application.

Based on the mentioned discretionary power, the Secretary of Foreign Relations decided that the established limitations would not be enforced in matters pertaining to the mining and metallurgical industries in which foreigners may invest whatever percentage of interest they may deem convenient (either more or less than the 49%, maximum prescribed for other activities). This resolution of the Foreign Relations Department was sent to the Mexican Mining Chamber, which transmitted it to the members of the institution by Circular No. 1833, dated July 8, 1944. However, the Department refused to commit itself in a general manner with regard to the aforementioned exemption, reserving its jurisdictional power to deny permits in particular cases.

MARKETS—Trends and Prices

Two-Year Suspension of 4c. Copper Duty Removes Uncertainty Over Supply Outlook

AN EVENT OF FAR-REACHING importance to the copper industry occurred on April 29 when President Truman signed the measure suspending the 4c. import duty until March 31, 1949. The final version of the bill exempted copper sulphate from duty suspension because the supply situation in this material is not critical. Fabricated copper products were freed from import duty limitations.

Trading in copper suffered during April because of the long period of uncertainty over final action on the measure. Removal of the duty is certain to benefit fabricators in that they can operate in a market that is expected to revolve around a single price so far as purchases for domestic consumption are concerned. Whether the foreign market can be stabilized and prices abroad maintained at the level likely to be established here is uncertain. The foreign market in prewar days was governed largely by the London wirebar quotation. London quotations at present are fixed by the British Ministry of Supply and carry little weight in the free market.

Marketing of copper since the end of the war has been a simple matter. Demand at all times was well in excess of supply and prices moved upward sharply throughout the industry. Toward the end of April the buying movement lacked the abandon that characterized the market earlier in the year, with some indications that the so-called pipeline is gradually filling up. Also, many observers felt that a further rise in the price level, which appeared imminent in view of the wide spread in domestic and foreign quotations, could not be sustained for long, owing to mounting consumer resistance. Prevailing prices for copper are generally viewed as high, even under our inflated economy, and world production of copper is bound to increase.

Though final action on the copper duty occurred before the end of the month, producers were slow to act in adjusting the general price structure. Domestic copper sold at 21½c., Connecticut Valley, on the last day of the month, and foreign buyers paid 23.75c., f.a.s. New York equivalent. Pressure to move the price of domestic copper up to the foreign equivalent was noted, even though the mood at present is for adjusting prices for commodities downward to stimulate the mass market for end products.

The trend in copper prices since the beginning of the year is indicated in the following monthly averages of E. & M.J.:

	Domestic f.o.b. Refinery	Foreign f.o.b. Refinery
January	19.270	19.926
February	19.349	20.403
March	20.911	22.206
April	21.225	23.315

Copper Institute placed domestic production of refined copper for March at 88,131 tons, against 77,591 tons in February. Production was at the highest level since October, 1944. Deliveries to domestic consumers in March came to 123,590 tons, of which the Metals Reserve contributed 30,541 tons.

The tonnages of foreign copper available from the Government's stocks are expected to diminish to the vanishing point in the next few months. The total quantity in the hands of Metals Reserve on March 31 was 25,931 tons. Domestic consumers have been buying bonded copper for future delivery. The extent of this buying will not be known until official import statistics become available.

Consumption of refined copper in the United States, based on statistics compiled for the fabricating division of the copper industry, in tons:

	1946	1947
January	100,213	139,263
February	73,316	118,633
March	73,225	117,981
April	86,619	.....
May	93,007	.....
June	91,586	.....
July	96,743	.....
August	119,644	.....
September	113,305	.....
October	130,191	.....
November	130,745	.....
December	124,432	.....
Total	1,233,026	.....

Stocks of refined copper in the hands of fabricators at the end of March totaled 396,580 tons, against 392,376 tons a month previous.

During April wide publicity was given to a statement to stockholders of the American Smelting & Refining Co. by its newly elected chairman of the board, Roger W. Straus. "In my opinion," he said, "metal prices have reached their peak and the next movement will be downward. However, because of sharply increased cost for labor and materials I do not think prewar metal prices can get out the needed production. Therefore, the future level of such prices will be higher than the average before the war."

Lead supply has been increasing, primary as well as secondary. However, consumers continue to take all of the metal available and the market throughout April showed no indications of easing. Producers observed

Receipts of Lead, Primary and Secondary

(American Bureau of Metal Statistics)

Receipts of lead in ore and scrap by all smelters, primary and secondary, plus imports of refined lead, are summarized as follows, in tons:

	Scrap (a)	Ore (b)	Imports (c)	Total
1945	310,500	478,500	255,200	1,041,200
1946:				
January	30,000	38,977	12,956	81,933
February	25,600	34,552	8,695	68,847
March	25,500	29,395	7,288	62,183
April	29,500	26,894	6,970	63,364
May	23,000	23,105	4,737	50,842
June	26,700	22,424	5,084	54,208
July	39,800	43,359	5,549	88,708
August	25,300	35,715	14,925	75,940
September	27,900	34,898	9,018	71,816
October	26,000	27,705	17,872	71,577
November	24,300	32,192	12,814	69,306
December	39,300	38,508	10,340	88,148
Total	342,900	387,724	116,248	846,872
1947:				
January	41,000	40,091	14,710	95,801

(a) Content of lead plus antimony, estimated as recoverable. (b) Lead content estimated as recoverable, including lead in imported ore. (c) Refined pig lead plus lead content of scrap. The quantity of scrap so included in 1945 was 2,844 tons and in 1946, 2,466 tons, which supply may be duplicated in the first column.

MARKETS—Trends and Prices

that the buying has been more orderly, with consumers about convinced that the supply outlook is bound to improve with the market at 15c. a pound, New York. Domestic refineries produced 140,921 tons of lead in the first quarter of 1947, which compares with 123,551 tons in the last quarter of 1946. Recovery of secondary lead from lead-base scrap in January amounted to more than 41,000 tons, a new monthly high.

Zinc producers are following the trend in world production with more than ordinary interest, largely because a recovery in output by foreign producers is expected to result in increased competition and possibly some price uncertainty. Early in April foreign buyers purchased Prime Western zinc on the basis of 10⅞c., Gulf ports, but as the month ended there were sellers at 10⅝c. The domestic market for Prime Western continued at 10½c., East St. Louis, for the fifth consecutive month.

Tin advanced to 80c. a pound for the top grade early in April, or 10c. higher than the previous selling basis. In view of the fact that the Government was forced to raise its purchasing basis for Bolivian concentrates, the upward adjustment in the quotation for the metal was expected. Mine output of tin for 1947 is estimated at 117,000 long tons, or 24,000 tons less than the official estimate made last October.

Consumers of tin were relieved on learning that the smelter at Texas City suffered virtually no damage from the series of explosions that wrecked the industrial center of that city on April 16.

Continued uncertainty over future sales policy of European quicksilver producers was reflected in a quiet and unsettled domestic market. Producers here seemed to tire of holding on to metal for improved marketing conditions and sold quicksilver for shipment at concessions. On spot the price declined to $85 per flask. Stocks in Europe are said to be large, with Yugoslavia, now in possession of the Idria mine, competing for business.

Tungsten ore was fairly active and higher prices obtained here and abroad. New uses for tungsten point to an expanding market.

Silver declined 2c. an ounce on renewed selling pressure from holders of foreign metal in New York.

Major Metals

U. S. DAILY AND AVERAGE PRICES

1947 April	Electrolytic Copper: Domestic (a) Refinery	Electrolytic Copper: Export (b) Refinery	Straits Tin: New York	Lead: New York	Lead: St. Louis	Zinc: East St. Louis
1	21.225	22.700	No Quotation	15.000	14.800	10.500
2	21.225	22.675	No Quotation	15.000	14.800	10.500
3	21.225	23.300	80.000	15.000	14.800	10.500
4	21.225	23.300	80.000	15.000	14.800	10.500
5	21.225	22.675	80.000	15.000	14.800	10.500
7	21.225	22.750	80.000	15.000	14.800	10.500
8	21.225	23.425	80.000	15.000	14.800	10.500
9	21.225	22.675	80.000	15.000	14.800	10.500
10	21.225	22.800	80.000	15.000	14.800	10.500
11	21.225	23.050	80.000	15.000	14.800	10.500
12	21.225	22.850	80.000	15.000	14.800	10.500
14	21.225	22.750	80.000	15.000	14.800	10.500
15	21.225	23.675	80.000	15.000	14.800	10.500
16	21.225	23.675	80.000	15.000	14.800	10.500
17	21.225	23.675	80.000	15.000	14.800	10.500
18	21.225	23.675	80.000	15.000	14.800	10.500
19	21.225	23.675	80.000	15.000	14.800	10.500
21	21.225	23.675	80.000	15.000	14.800	10.500
22	21.225	23.575	80.000	15.000	14.800	10.500
23	21.225	23.575	80.000	15.000	14.800	10.500
24	21.225	23.675	80.000	15.000	14.800	10.500
25	21.225	23.675	80.000	15.000	14.800	10.500
26	21.225	23.675	80.000	15.000	14.800	10.500
28	21.225	23.675	80.000	15.000	14.800	10.500
29	21.225	23.675	80.000	15.000	14.800	10.500
30	21.225	23.675	80.000	15.000	14.800	10.500
AVERAGES FOR MONTH						
April	21.225	23.315	80.000	15.000	14.800	10.500
AVERAGES FOR WEEK						
April						
2	21.225	22.613	70.000	15.000	14.800	10.500
9	21.225	23.021	80.000	15.000	14.800	10.500
16	21.225	23.133	80.000	15.000	14.800	10.500
23	21.225	23.642	80.000	15.000	14.800	10.500
30	21.225	23.675	80.000	15.000	14.800	10.500
CALENDAR WEEK AVERAGES						
April						
5	21.225	22.863	77.500	15.000	14.800	10.500
12	21.225	22.925	80.000	15.000	14.800	10.500
19	21.225	23.521	80.000	15.000	14.800	10.500
26	21.225	23.642	80.000	15.000	14.800	10.500

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis, as noted. All prices are in cents per pound.

(*a*) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.275c. per pound, the average differential for freight and delivery charges.

(*b*) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.q. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West in nearly all instances command a premium of 1c. per pound over the current market for Prime Western but not less than 1c. over the *Engineering and Mining Journal's* average quotation for Prime Western for the previous month; the premium on Special High Grade in most instances is 1¼c.

Quotations for lead are for common lead.

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

1947 April	Sterling Exchange "Checks"	Silver (c): New York	Silver (c): London	Gold: London	Gold (d): United States
1	402.500	75.750	46d.	172s. 3d.	$35.00
2	402.500	75.750	46d.	172s. 3d.	35.00
3	402.500	75.750	46d.	172s. 3d.	35.00
4	402.500	76.000	Holiday	Holiday	35.00
5	(c)	(c)	(c)	(c)	35.00
7	402.500	76.000	Holiday	Holiday	35.00
8	402.500	76.000	46d.	172s. 3d.	35.00
9	402.500	76.000	45½d.	172s. 3d.	35.00
10	402.500	76.000	45½d.	172s. 3d.	35.00
11	402.500	76.000	45½d.	172s. 3d.	35.00
12	(c)	(c)	(c)	(c)	35.00
14	402.500	76.000	45½d.	172s. 3d.	35.00
15	402.500	76.000	45½d.	172s. 3d.	35.00
16	402.500	76.000	46d.	172s. 3d.	35.00
17	402.500	76.000	46d.	172s. 3d.	35.00
18	402.500	75.625	46d.	172s. 3d.	35.00
19	(c)	(c)	(c)	(c)	35.00
21	402.500	75.625	46d.	172s. 3d.	35.00
22	402.500	75.625	46d.	172s. 3d.	35.00
23	402.500	75.625	46d.	172s. 3d.	35.00
24	402.500	75.625	46d.	172s. 3d.	35.00
25	402.500	75.625	46d.	172s. 3d.	35.00
26	(c)	(c)	(c)	(c)	35.00
28	402.500	75.625	46d.	172s. 3d.	35.00
29	402.500	74.000	46d.	172s. 3d.	35.00
30	402.500	73.750	45d.	172s. 3d.	35.00
AVERAGES FOR MONTH					
April	402.500	75.653	45.825	—	35.00
AVERAGES FOR WEEK					
April					
2	402.500	74.950	—	—	—
9	402.500	75.950	—	—	—
16	402.500	76.000	—	—	—
23	402.500	75.700	—	—	—
30	402.500	74.925	—	—	—

Calendar week averages, New York Silver: April 5th, 75.800; 12th, 76.000; 19th, 75.925; 26th, 75.625.

(*c*) No market (Saturday).

(*c*) Determined by Handy & Harman on the basis of market prices for bar silver, in cents per troy ounce .999 fine, in amounts of 50,000 oz. or more, nearby delivery, New York. Price quoted is in cents and one-eighth cent fractions, and is usually about one-quarter cent below the market to allow for delivery, carrying, and marketing. In addition to foreign silver, the quotation also applies to domestic and Treasury silver if such silver enters into the market. The Treasury's purchase price of newly mined domestic silver 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(*d*) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold in domestic and imported ore or concentrate is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

MARKETS—Trends and Prices

Miscellaneous Metals

(Monthly Averages)

Average prices of miscellaneous metals for March and April:

	March	April
Quicksilver, N. Y. flask	86.846	85.769
Antimony (a)	33.748	35.940
Antimony, bulk, Laredo	30.808	33.000
Antimony, in cases, Laredo	31.212	33.500
Antimony, Chinese (b)	.....	.....
Platinum, oz. troy	58.000	60.885
Cadmium (c)	175.000	175.000
Cadmium (d)	177.500	177.500
Cadmium (e)	180.000	180.000
Aluminum ingot	15.000	15.000
Magnesium	20.500	20.500

(a) New York, packed in cases, in lots of 5 tons or more but less than a carload. (b) Nominal. (c) Producer's price for commercial sticks. (d) Average producers' and platers' quotations. (e) Special shapes sold to platers.

E. & M. J. Weighted Index of Non-Ferrous Metal Prices

100 is composite for 1922-3-4. (Copper, Lead, Zinc, Tin, Silver, Nickel, Aluminum)

1937	90.86	1942	86.80
1938	73.67	1943	88.74
1939	77.71	1944	88.74
1940	79.22	1945	90.86
1941	83.49	1946	110.057

	1945	1946	1947
January	88.74	96.42	140.88
February	88.74	96.42	140.42
March	88.74	96.42	150.71
April	88.74	96.42	153.14
May	88.74	96.42	.....
June	88.74	107.16	.....
July	88.74	117.11	.....
August	88.74	113.32	.....
September	91.16	113.32	.....
October	96.40	114.25	.....
November	96.42	131.23	.....
December	96.42	142.19	.....

Official London Prices

Since Dec. 18, 1939, the British Ministry of Supply has named maximum delivered prices for the major non-ferrous metals. Prevailing delivered prices for consumers in the United Kingdom follow:

	Per Long Ton £	s.	d.
COPPER:			
Electrolytic, high conductivity	137	0	0
Fire refined, high conductivity	137	0	0
Fire refined, high grade	136	10	0
Fire refined, min. 99.2 percent	135	10	0
Fire refined, min. 99.7	136	0	0
Hot rolled black wire rods	132	0	0
LEAD:			
Soft, foreign, duty paid	90	0	0
Soft, Empire	90	0	0
English refined	91	10	0
ZINC:			
Foreign (G.o.b.), duty paid	70	0	0
Domestic (G.o.b.)	70	0	0
Prime Western and debased	70	0	0
Refined and electrolytic	70	15	0
Minimum 99.99 percent	72	5	0
TIN:			
Ingot, 99 percent	437	0	0

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York, unless otherwise stated

MISCELLANEOUS METALS

(April 30, 1947)

Aluminum, ingot, 99 plus percent, lb.	15c.
Antimony, domestic, spot, lb., 5 tons or more, in cases	35.940
Bismuth, ton lots, lb.	$2.00
Cadmium, commercial sticks, lb.	$1.75
Calcium, lb. ton lots, 97 @ 98 percent, cast	$1.85
Chromium, 97 percent grade, lb.	89c.
Cobalt, 97 to 99 percent, per lb.	$1.50
Indium, troy oz.	$2.25
Nickel, electrolytic cathodes, lb.	35c.
Magnesium, 99.8 percent, carloads, lb.	20½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation wholesale lots) troy oz.	$63.00
Quicksilver, flask of 76 lb., 25 flasks or more	$85.00
Selenium, 99.5 percent, lb.	$1.75
Silicon, minimum 97 percent, spot, carloads, lb.	14.75c.
Tellurium, lb.	$1.75 nom.
Thallium, 100 lb. or more, lb.	$20.00
Titanium, 96 to 98 percent, lb.	$5.00

METALLIC ORES

Beryllium Ore, 8 to 12% BeO, f.o.b. mine, per unit	$14.00@$16.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry 48% Cr_2O_3, 2.8 to 1 ratio (Prices nominal)	$37.00@$38.00
48% Cr_2O_3, 3 to 1 ratio	$39.00@$40.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$5.95
Mesabi bessemer	$5.70
Old Range non-bessemer	$5.80
Mesabi, non-bessemer	$5.55
Lead (Galena) 80 percent, Joplin, Mo., ton	$195.65
Manganese Ore—Per long ton unit of Mn, basis 48 percent manganese, subject to premiums and penalties, f.o.b. cars Atlantic and Gulf ports, duty paid, 67@69c.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	45c.
Tungsten Ore, per unit of WO_3:	
Foreign, 60 percent, duty paid	$26.00@$27.00
Domestic, scheelite, 60 percent and upward	$26.50@$27.50
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton	$64.00

METALLIC COMPOUNDS

Arsenious Oxide (arsenic trioxide) lb., in bbl., carload lots	6c.
Cobalt Oxide, 70 to 71 percent, lb.	$1.06
Copper Sulphate, 100 lb.	$7.60

ALLOYS

Beryllium Copper, 2.5 to 3 percent Be, per lb. of contained Be	$14.75
Ferrochrome, 65 to 70 percent, per lb. of Cr contained	15.60c.
Ferromanganese, 78 to 82 percent, gross ton	$135.00
Ferromolybdenum, 55 to 65 percent Mo, lb. of Mo contained	95c.
Ferrosilicon, 50 percent, per lb. of contained Si	7.45c.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$2.08
Ferrovanadium, per lb. of V delivered	$2.70@$2.90
Silicomanganese, 1 percent C, per lb., contracts	6.45c.

NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (U.S funds), ton:	
Crude No. 1	$650@$758
Crude No. 2	$165@$385
Spinning fibers	$124@$233
Paper stock	$44@$49.50
Shorts	$14.50@$26.50
Vermont, f.o.b. Hyde Park:	
Shingle stock	$62.50@$65.00
Paper stock	$44.00@$53.00
Shorts	$14.50@$28.50
Floats	$19.50
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$8.50@$9.00
Missouri, 93 to 94 percent $BaSO_4$, per short ton	$8.25@$8.50
Bauxite, long ton:	
Domestic, crude, 50 to 52 percent (not dried)	$5.00
Domestic, chemical, 55 to 58 percent	$7.50@$8.50
Domestic, abrasive, 80 to 84 percent	$16.50
China Clay, f.o.b. mines, ton:	
South Carolina and Georgia, No. 1, bulk	$6.75@$8.00
Delaware, No. 1	$15.00
Feldspar, bulk ton:	
Potash feldspar, 200 mesh	$17.00
Glass spar, white, 20 mesh	$11.75
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois 70 percent, all rail movement, ton	$33.00
Acid 98 and 1 percent, bulk, ton	$37.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, f.o.b. Washington	$22.00
Mica: Domestic producers quote on punch and sheet as follows: Punch, 22c. per pound; 1½x2 inch, $1.10; 2x2 inch, $1.60; 2x3 inch, $2.10; 3x3 inch, $2.75; 3x4 inch, $3.50; 3x5 inch, $4; 4x6 inch, $5. Wet ground, very fine, $90 per ton. Special grades command premium. Bulk sales dry ground, $32.50 per ton. Scrap, $28 per ton and up.	
Ocher, Georgia, ton	$19.00@$22.00
Pyrites, Spanish, per long ton unit of S, c i f, Atlantic ports	12c. nom.
Silica, in bags, 325 mesh, ton	$20.00@$40.00
Sulphur, Texas, mines, long ton	$16.00
Talc, f.o.b. works, ton:	
New York, double air-floated, 325 mesh	$12.00@$15.00
Vermont, extra white, 200 mesh	$9.50@$10.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$14.50

IRON AND STEEL

Pig Iron, Valley furnaces, gross ton: Basic	$33.00
Steel, base price, Pittsburgh Billets, gross ton	$42.00
Structural shapes, 100 lb.	$2.65

WASHINGTON REFLECTIONS

McGRAW-HILL WASHINGTON NEWS BUREAU

Congress Inclined To Pass Drastic Curbs on Labor

In late April it was evident that, after many years of pussyfooting, Congress will pass a labor bill intended to end many of the abuses cultivated by the New Deal labor policy.

The House passed an unexpectedly severe measure in mid-April, that was ushered in with a strong committee report. It provides for enlargement of NLRB, severs the prosecutor function from the judicial, and requires the board to base action on preponderant evidence. It outlaws industry-wide bargaining, sympathy strikes, jurisdictional strikes, secondary boycotts, Communist-influenced unions, and mass picketing. It prohibits the closed shop and permits a union shop only after a majority vote by secret ballot of all employees. Labor organizations are made legally responsible and supervisory employees are excluded from unions. Welfare funds are qualified and protected from union control. Measures are provided to prevent strikes against the public interest.

In late April the Senate began debate on a less drastic measure reported out of committee, but nevertheless strong for the Senate committee, which has been the primary bottleneck to labor reform for several years. The measure also enlarges the NLRB and requires it to act on "substantial" evidence. It prohibits secondary boycotts, jurisdictional strikes, and violation of agreements. It excludes supervisors from unions and outlaws the closed shop, permitting, however, union shops.

It is likely that the final action by Congress will be quite drastic. What the President will do with the legislators' product is conjectural.

Antimony Shortage Is Expected to Continue

The 1947 supply of antimony will not support consumption at the 1946 rate, despite some improvement in domestic production, according to a Civilian Production Administration report just published.

Consumption of primary and secondary antimony in the United States last year was 37,378 short tons, exceeding new supplies by approximately 8,000 tons, the report said. The deficit was made up by large withdrawals from Government stockpiles, now close to exhaustion.

The report notes that 1946 was the first full year in which antimony consumption was not affected by special war uses, and is therefore an indication of the pattern which can be expected during 1947. The sharp drop in new supplies from the 1945 level was caused chiefly by the elimination of Bolivia as a major source of imports. The breakdown in the Chinese antimony industry, changeover of Bolivian output to European consumers, and a drop in the Bolivian production, will combine to prolong the deficiency for some time.

Truman Signs Two-Year Copper Tariff Waiver

Passage in the Senate of the Patterson copper imports bill (E. & M. J., April, p.106) without a fight, took Washington observers by surprise late last month. A contest over the length of time the four-cent excise tax would be waived had appeared certain. President Truman signed the measure on April 29.

Senators of mining states, in a meeting April 15, appointed a strategy committee to lead the fight on the floor to limit the bill to a one-year period. As passed by the House and approved by the Senate Finance Committee, it provided for a two-year suspension of the tariff. Senator Pat McCarran, Nevada, head of the strategy group, was outspokenly in favor of the single year restriction.

However, the bill passed the Senate on April 21 with little trouble. There was one amendment, to exclude copper sulphate from the duty-free provisions of the measure.

When a vote was called on the bill, the reason why there was no fight became apparent. Senator Millikin, who called the bill up for passage, was asked by Senator McCarran to read into the Congressional Record a letter from Representative Harold Knutson, chairman of the House Ways and Means Committee.

The Knutson letter promised that, in the event of excessive imports of copper under the bill's provisions, he would sponsor a bill to reimpose the tariff. Knutson added that Speaker Martin and Majority Leader Halleck had given their assurance of cooperation in the matter. The letter stated, "they again gave assurances that the four-cent import tax on copper would be reimposed if imports were to assume such proportions as to jeopardize the domestic copper industry."

Senator McFarland, Arizona, stated the case for all the mining states legislators by saying "I personally feel that a two-year repeal [of the tariff] is too long. It is only because of the letter from the chairman of the committee in the other house and the assurance of the distinguished chairman of the Finance Committee (Millikin) that I acquiesce, however unwillingly, to passage of this bill. I consider it dangerous legislation."

The House accepted the amendment, as drawn.

Subcommittee Reports Favorably on Premiums

Premium Price Plan legislation, slated for consideration by the House of Representatives late in May, will be a source of controversy in Congress in the next few months. The odds are now about even on passage of subsidy legislation.

The Russell Bill (H.R.2455), vehicle for the continuation of the plan, has been approved by the Mines and Mining subcommittee of the House Committee on Public Lands, and obtained final committee approval, after a cut of $20,000,000 in the appropriation, on April 25.

Strategy among mining senators had been to wait for a House-passed measure before taking action, but late in April Senator Pat McCarran introduced a companion bill in the Senate.

The thinking in Washington has been that the House will be the stumbling block to passage of any bill continuing the subsidy for copper, lead, and zinc, and other minerals, but that any measure passing the House would be likely to go through the Senate.

Opposition to the plan has come from the Interior Department for the first time. In a report on an earlier bill, also Russell's, the Bureau of Mines stated its objections in no uncertain terms. This report was not accepted by the subcommittee considering the bill. Later, Undersecretary Oscar Chapman, in another of the Departmental high command's swings between sponsorship of free enterprise and the Raushenbush doctrine of "encroaching control," expressed Interior's opposition to the bill on the grounds that on a permanent basis it would lead to regimentation of the mining industry. The bill was also strongly opposed by the Lead Industries Association.

One of the hurdles the bill must jump is the determination of Republican leaders to economize. The $80,000,000 appropriation contemplated in the bill is almost certain to be attacked by the economy group.

A Congressional "deal" involving the Russell bill and the Patterson copper imports bill seemed in the offing late in April, but did not materialize. Senator Millikin of Colorado

had told Senate Finance Committee members that both bills had their basis on the same ground, that of domestic shortage. It appeared that the Westerners would allow the tariff concession through if the subsidy plan were continued. The Patterson Bill, however, was subject to a different "deal" and was passed in short order.

Committee Makes Drastic Cut in Interior Budget

The Interior Department's program for postwar increases in the search for critical minerals, and development of advanced technological mining methods received a decided setback last month when the House Appropriations Committee reported out the 1948 budget. Interior appropriations as a whole were cut by 47%.

The Geological Survey's estimated budget for next year was cut nearly in half, leaving less money available than was appropriated for this year's operations. The Survey had asked for $18,104,900. The House cut this down to $9,113,230.

Topographic and geologic surveys were the hardest hit, the former cut from $8,500,000 to $3,000,000, the same as this year's figure, and the latter from $3,135,000 to $1,690,000, which is less than the 1947 allowance. Stream gaging was cut from $3,750,000 to $2,578,680.

The two heavy Survey cuts will mean a slowdown in essential mapping and the abandonment of about 30 projects in the fields of geological and geophysical investigation.

The Bureau of Mines, hurt proportionately somewhat less than the Survey, had its $16,834,000 budget pared to $10,983,875.

The appropriation for investigation and development of domestic mineral deposits, except fuels, was cut exactly in half, leaving $800,000 with which to carry on a program of proving up new deposits of critical minerals. This cut will mean halving the exploration program. Inasmuch as about half of the current projects concern lead, it appears that nearly all other mineral search projects will be eliminated next year, and many of the mining field stations will be shut down. Appropriations for this work this year amounted to $1,700,000.

A $600,000 slash in the appropriation for mining experiment stations will necessitate a very heavy reduction in activity, particularly because the appropriations committee ruled that all the stations must be maintained. This appropriation is less than half of the one approved for the current year's operations.

Metallurgical research and pilot plants were reduced from a $1,600,000 estimate to $600,000, which means abandonment of whole research projects. Among such projects which conceivably will be dropped are bauxite studies at Bauxite, Ark., sponge iron experiments at Laramie, Wyo., and magnesium research at Albany, Ore., and Pullman, Wash.

In cutting the appropriation for economics of mineral industries from $1,233,000 to $555,000, the House committee ruled out continuance of all bituminous coal studies. The slash keeps studies on metals and nonmetals at this year's level. The committee specifically cut $350,000 scheduled for bituminous coal studies out of the economics budget.

A reduction of $223,000 in the item for coal investigation, which leaves only $57,000 available, will probably wipe out the major lignite utilization studies now being carried on in North Dakota.

The historic budget appropriations procedure by Congress, in which the House slashes, the Senate restores, and a conference splits the difference, is not expected to hold particularly true this year. The Western mining senators can be expected to restore some of the more important items to the Bureau and Survey budgets, but a militant, economy-seeking Republican majority will hold down restoration to a minimum.

Acceptance of Accelerated Depreciation Seems Likely

Recent informal opinions by the U. S. Tax Court on claims by industry for accelerated depreciation due to intensive war use of plant and equipment indicate that the court is taking a more liberal view of the idea than is the Bureau of Internal Revenue.

Surprisingly, the court so far has not had to give any formal opinion on the matter, probably because of the lack of enough cases of this type to make a formal opinion necessary.

It is relatively safe to conclude from recent cases, although the court does not wish too much reliance placed on its informal opinions, that the court (1) recognizes the validity of allowing abnormal depreciation due to intensive use of facilities: (2) will accept overall data showing increased activity as evidence of such use; (3) gives credence to informed testimony on plant conditions and (4) may allow accelerated depreciation on all productive facilities in a plant.

Memoranda and briefs on the Locke Machine Co. case show the Commissioner of Internal Revenue holding that the company's statements on increased activity, taken alone, were not conclusive on the amount of depreciation suffered. The court, however, allowed the company nine percent for 1941 as against seven percent approved for four previous years by the commissioner, who would have preferred a five percent allowance. Similarly, in the case of N. A. Woodworth Co. vs. Commissioner, the court allowed a 12% depreciation for 1941 over a protest by the commissioner.

So far the commissioner has denied all claims for accelerated depreciation on a plant-wide basis. In some instances, the commissioner has allowed larger depreciation on certain machines where the taxpayer proved conclusively that their useful life was shortened by intensified use.

The tax bureau has held that any modification of normal depreciation will be confined to those items where useful life depends on wear and tear, and, that since accelerated depreciation is allowable only to the extent that maintenance fails to arrest depreciation.

Metal Mining Unionization Is Comparatively High

Metal mining ranks among industries in which more than 80% of the employees are covered by union agreements, according to a study by the Bureau of Labor Statistics. Nonmetallic mining and quarrying was put in the 20-39% group.

The study also asserts that more than half of the metal mining employees covered by union contracts work under maintenance of membership clauses. This means they don't have to join a union but, once they do, they can't resign without losing their job.

More than half the employees under contract in iron mining and non-ferrous smelting and refining are covered by automatic checkoff.

For non-ferrous metals, a breakdown of union security provisions shows 185,000 under maintenance of membership, 40,000 under union shop, 30,000 under closed shop and 15,000 under union shop with preferential hiring.

ANMB Selects Advisors on Non-Ferrous Metals

The Army and Navy Munitions Board has selected the following persons to serve on its non-ferrous metals industry advisory committee. The purview of this committee does not include copper or the light metals.

O. W. Bilharz, Bilharz Mining Co.; J. M. Bowlby, Eagle-Picher Mining and Smelting Co.; G. H. Chambers, Foote Mineral Co., Inc.; Sidney Cohn, Sigmund Cohn & Co.; Robert E. Dwyer, Anaconda Copper Mining Co.; Benno Elkan, National Zinc Co.; Andrew Fletcher, St. Joseph Lead Co.; Leo Halpern, American Smelting & Refining Co.. Marshall L. Havey, New Jersey Zinc Co.; Carl A. Ilgenfritz, U. S. Steel Corporation of Delaware; J. H. McElhinney, Wheeling Steel Co.; Charles Pack, Doehler Jarvis Corp.; N. W. Rice, U. S. Smelting, Refining and Mining Co.; Fletcher W. Rockwell, National Lead Co.; Samuel H. Williston, Cordero Mining Co.; and Howard I. Young, American Zinc, Lead & Smelting Co.

NEWS OF THE INDUSTRY

Chamber of Commerce Holds Mineral Symposium

The "have-not" controversy was discussed by speakers who addressed the U. S. Chamber of Commerce in Washington, April 30, in a symposium on "Foreign vs. Domestic Supply of Mineral Resources."

Otto Herres, vice-president, Combined Metals Reduction Co. accused "political and academic thinkers" of confusing the uniformed public by propagandizing a "have-not policy" in essential minerals. Acceptance of this view, he said, will lead to tariff cuts and increased imports at the expense of domestic mining, and enable ambitious advocates of a planned economy to expand bureaucracy and regimentation to an unsurpassed global scale.

He blamed current shortages of metals on abnormal war demands, pentup civilian demands, curtailed development work during the war and the low-price years of the 1930's, and strikes and manpower shortages during postwar years. Scarcities will be cured, he predicted, by high prices, increased production, and substitutions. He added however, that the "relatively limited supply of statistical reserves is a matter of concern."

Foreign reserves of essential metals are no more inexhaustible than our own, he pointed out, citing the following estimated reserves of copper, lead, and zinc in terms of years of supply of remaining metal as published in *E.&M.J.*, January, 1947: Domestic reserves—Copper, 34 years; lead, 12; and zinc, 19. Foreign—copper, 33 years; lead, 17; and zinc, 22. He asked what the U. S. would do for metal when the State Department's program of raising all countries to our living standards is achieved, and other countries are industrialized. Other countries will take measures, he concluded, to protect their reserves long before that time is reached.

Charging the Government, particularly the Ickes ideology in the Interior Department, with too great a participation in economic affairs, Mr. Herres states that this economic meddling "may place us on the road leading to permanent control of a managed economy. The Interior Department under Ickes proposed nationalizing all mineral land and royalty payments to the Government on minerals produced. Left-wing labor groups go a step farther and advocate nationalization of the non-ferrous metal industry."

"The Government would do better to cooperate and assist the mineral industries by furnishing an incentive for exploration and development of mines producing essential minerals and an inducement for initial production from new operations," he suggested.

Richard R. Deupree, chairman of the Army and Navy Munitions Board, reaffirmed the board's $1,800,000,000 stockpiling aims for the next five years. He explained, however, that, due to high prices and critical civilian shortages in many strategic items, the board will not attempt to spend all of the $100,000,000 appropriated for this year's military requirements.

Elmer Pehrson, chief of the Economics and Statistics Branch of the Bureau of Mines, appraised the nation's mineral self-sufficiency. A study of 39 strategic minerals reveals that during the period 1940-44, we produced 90% or more of our needs of 15 of them, including coal, iron, petroleum, sulphur, and fertilizers.

We produced 50 to 90% of our war needs of 10 minerals, including copper, lead and zinc. Output of the remaining 14 minerals, he said, contributed less than 50% of self-sufficiency. Of these 14 minerals, 11 contributed less than 20% of our needs.

Looking toward the future, Pehrson said it is becoming apparent that our ability to produce copper, lead and zinc is waning. "As demand returns to normal," he added, "we shall probably again achieve self-sufficiency in copper, at least for a short period, but lead and zinc requirements will continue to be met in part by imports."

Mr. Pehrson stated that major improvements in our minerals position can come only through discovery and technologic progress. "The major part of this job will have to be done by industry," he said, adding that "there are certain pioneering phases where the hope for monetary reward is so remote that the expenditure of private funds for these purposes would not be justified."

Claim Owners Must File Statement of Intention

Holders of mining claims on the Federal public lands are reminded that before July 1 of this year they must file a statement indicating their intention to retain ownership. Failure to file the statement required under the Federal mining laws will lay the claims open to relocation, in continental United States, or forfeiture, in Alaska. Statements are filed in the recorder's office of the United States county or of the judicial district in the territory of Alaska in which the land is situated.

During World War II the requirement for annual assessment work was waived with the proviso that the period of suspension would end at noon on July 1 following formal proclamation of the cessation of hostilities. As President Truman declared hostilities at an end on Dec. 31, 1946, claim owners again become liable for performance of annual assessment work during the year beginning July 1, 1947, and prior to that date must record statements of intention to retain ownership of their claims.

New Company To Explore Globe-Miami District

Amico Mining Corporation has been organized by Anaconda Copper Mining Co., Miami Copper Co., and Inspiration Consolidated Copper Co. for the purpose of exploring undeveloped lands in the Globe-Miami mining district of Gila County, Ariz., it was announced late in April. All of the outstanding stock of the newly formed corporation is owned by the three participating companies.

The holdings controlled by the Amico corporation, near Miami, Ariz., consist of the mining claims formerly known as Van Dyke Copper Co. and Sho Me Copper Co. properties, and certain undeveloped adjoining areas contracted to Amico by Miami Copper Co. and Inspiration Consolidated Copper Co. Total area of ground acquired is approximately 3,300 acres. Exploratory drilling on the property is contemplated in the near future.

Heading the new corporation are C. E. Weed, president; E. L. Rossin, vice president; and R. E. Schneider, secretary treasurer. Directors, in addition to these officers, are W. D. Thornton, R. S. Newlin, and M. A. Caine.

Penoles Company Plans Annual Scholarships

Annual scholarships will be granted to outstanding Mexican students under a plan recently announced by Compañia Minera de Peñoles, S. A., which has operated mines and smelters in various states of Mexico for more than 50 years. In announcing the scholarships the Peñoles management stated that it believed the company would be fulfilling a social duty in tendering special educational opportunities to Mexican young men and women.

Several types of scholarships are offered under the plan, which will be

administered by a committee of five members appointed by the company and subject to its supervision. One scholarship, amounting to $1,500 per year (U. S. cy.), provides for four years of study leading to a degree in metal mining, non-ferrous metallurgy, or mining geology at a designated college or university in the United States. Two scholarships, each amounting to $400 per year (U. S. cy), will allow four years of undergraduate study leading to a professional degree at designated Mexican institutions. Candidates for scholarships must be Mexican citizens by birth, 18 to 25 years of age, and of high preparatory scholastic standing.

St. Joe Lead Shares In Exploring Quebec Find

St. Joseph Lead Co. will participate with Dome Exploration Co. (Quebec), Ltd., in developing lead properties held by Mistassini Explorations, Ltd., about 90 miles northeast of Chibougamou, Quebec, according to recent reports from Canada. Lead ore is said to occur at intermittent points for a length of 3½ miles on the Mistassini group of claims. A working party was scheduled to reach the property to begin exploration before the spring break-up.

The enterprise is to be financed through a new company being formed on 84 of the Mistassini claims. St. Joseph Lead Co. will share on a 50% basis with Dome in an initial firm commitment of $100,000 and options on 1,600,000 shares of the total 3,000,000 share capitalization. Dome Exploration Co. is a wholly owned subsidiary of Dome Mines, Ltd.

Bahama Survey Uses Airborne Magnetometer

A 50,000-square-mile airborne magnetometer survey of the entire Bahama area was started in April by the Aero Service Corporation for the following oil companies: Anglo-Bahamian Petroleum Co., Ltd., (Anglo Iranian), Bahamas Exploration Co., Ltd., (Gulf), Bahamas Oil Co., Ltd. (Superior), Shell Company of Bahamas Ltd., (Shell), Standard Oil Co. (Bahamas) Ltd., affiliate of Standard Oil Co. (N. J.).

It is expected that the observed magnetic variations of the area will contribute vital information to guide further exploration for oil.

A DC-3 plane will be used. It was modified to accommodate flight control instruments and a magnetometer developed by The Gulf Research and Development Co. As the survey will be made almost entirely over water, high-precision flight paths must be maintained by radio control. Three boats equipped with Shoran (developed for the Army by Radio Corporation of America) and anchored to known positions, will serve as triangulation points to determine the plane's position and guide it along predetermined flight paths. See *E.&M.J.*, August, 1946.

The survey will be conducted at two-mile intervals, and will require six to eight months to complete.

Index of Regional News

Region	Page	Region	Page
Africa	129	Michigan	120
Alaska	120	Montana	114
Arizona	107	Nevada	108
Australia	130	North Carolina	120
British Columbia	125	Ontario	123
California	106	Oregon	110
Canada	120	Philippines	128
Chile	128	Quebec	121
Colorado	117	Tri-State	118
Idaho	112	Utah	115
Manitoba	123	Washington	111
Mexico	127	Yukon	126

Estimated Tin Output Reduced by Study Group

Slow delivery of dredges, lack of coal, and labor problems have necessitated a downward revision of estimated production of tin in the Far East, it was disclosed after a meeting of the Tin Study Group that ended a four-day session in Brussels on April 19. Both producers and consumers of tin were represented at the first session of the international body.

Total mine output of tin for 1947 is now estimated at 117,000 long tons, against 141,000 tons estimated for this year at the London conference last October. The group also reduced its estimates for the next two years, placing output for 1948 at 163,000 tons and for 1949 at 201,000 tons. Previous estimates for 1948 and 1949 were 198,000 tons and 218,000 tons, respectively.

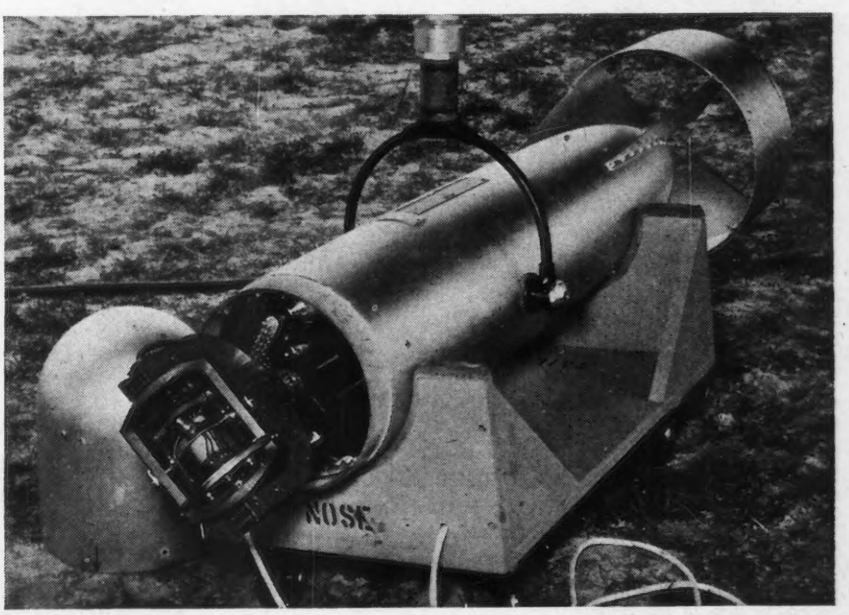
Estimated world consumption of tin for 1947 was set at between 140,000 and 150,000 tons. This tonnage, it was pointed out at the meeting, will be available only by substantially reducing world stocks. The United States uses approximately one-half of the world's production of tin.

Regulations for the control of tin production were not discussed, and this subject is not expected to come up before the group until there is a surplus, according to Donald D. Kennedy, chief of the International Resources Division, Department of State. The question of prices also was avoided.

Permanent headquarters of the international group is to be at The Hague.

Shareholders Block Plan To Liquidate Premier

A motion to wind up the affairs of Premier Gold Mining Co., Ltd., as recommended by the board of directors of the company (*E.&M.J.*, April, p. 158), was defeated at a general meeting of shareholders held April 1 in Vancouver, B. C. The motion required 75% of the total vote represented at the meeting to carry. Of a total of 1,988,889 shares voted, 1,475,366 shares were in favor of the motion and 513,523 against. Strenuous opposition to the proposed liquidation was expressed by minority shareholders present who wanted steps to be taken to perpetuate the company's existence.



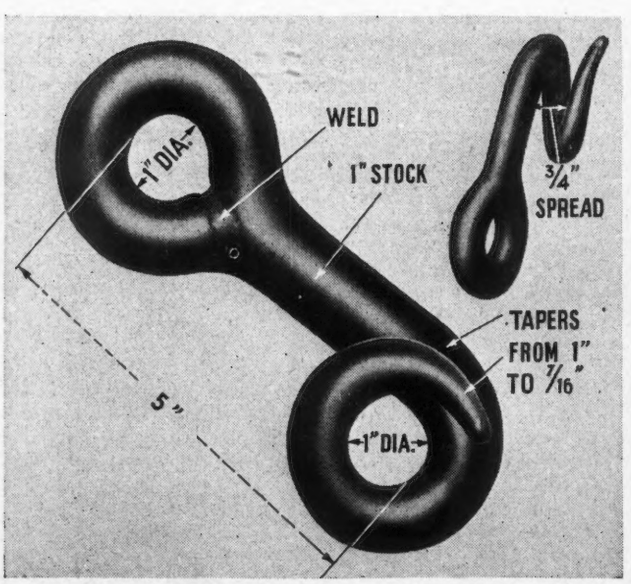
MAGNETIC DETECTING ELEMENT in head of airborne magnetometer developed by Gulf Research and Development Co. is always oriented parallel to earth's total magnetic field. The gimbal-mounted element is rotated at 3,600-r.p.m. by an air turbine. It scans the magnetic field, and provides signals which operate a Servo-motor control that maintains the rotating element in proper orientation constantly.

OPERATING IDEAS

Portable Ramp for Loading Mine Cars

Scraper loading operations can be speeded up in stopes, drifts, and crosscuts with this light-weight portable steel ramp. This unit, which was used in an Arizona copper mine, is constructed of standard steel shapes such as angles and channels. Legs of the ramp are made of standard pipe and fittings. Tubular members which join the legs to other parts of the ramp and serve as braces are attached with bolts. Easily replaceable wooden sideboards are bolted to the sides of the ramp. Because of these construction features, the ramp can be disassembled readily, and transported through narrow openings to such development headings as intermediate drifts. The scraper is operated from the two-drum air hoist mounted on top of the ramp as shown.

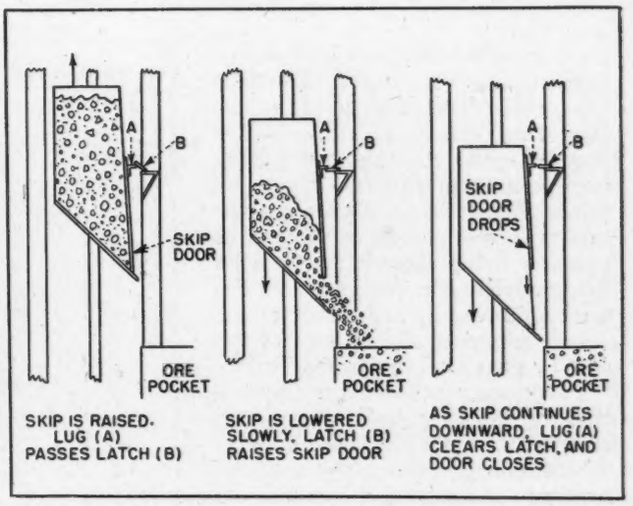
Two Time-Saving Devices



WHEN TAIL ROPES AND PULL ROPES of slushers are fitted with pigtail attachments like the one shown above, the ropes may be attached to the scraper easily. These attachments are especially useful in two-way scraping where the ropes have to be unhooked from one scraper and attached to another on the opposite side of the hoist.

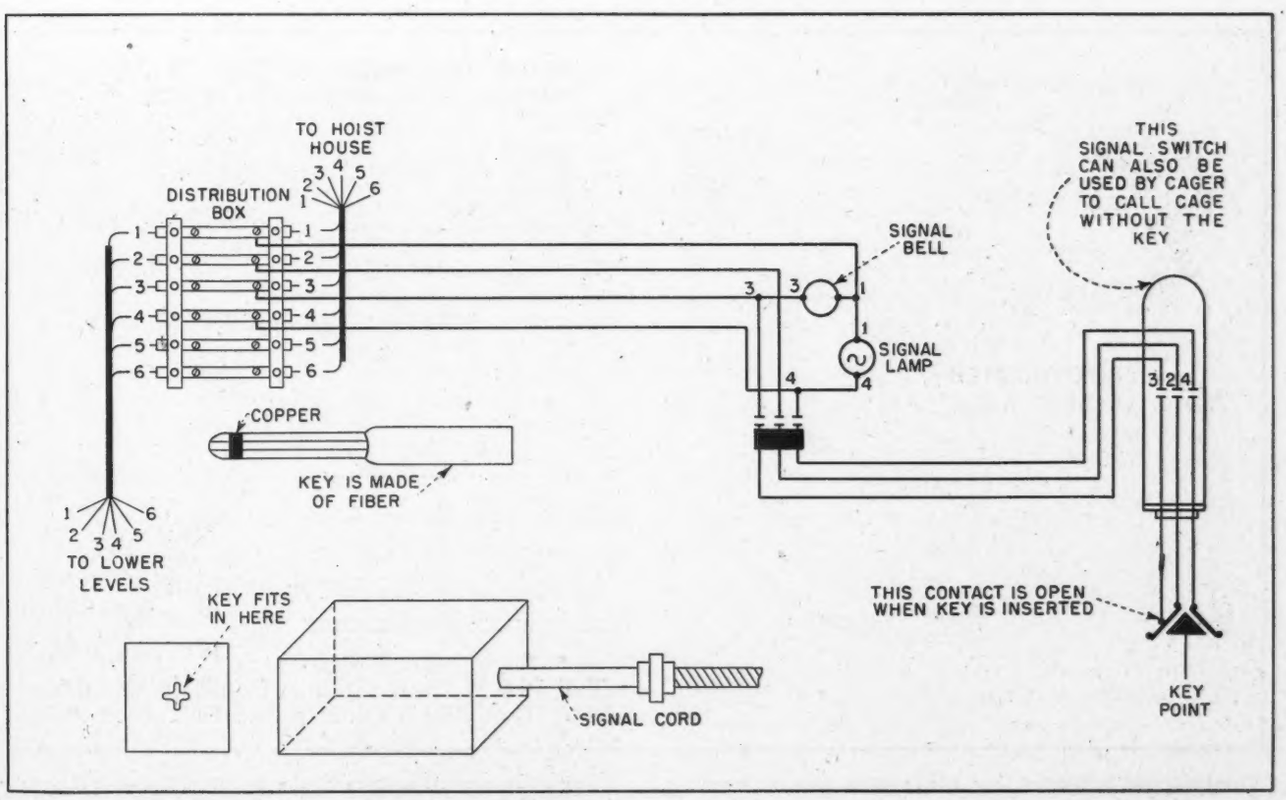
PNEUMATIC RIVET GUN serves as a handy tool for repairing mine timbers as shown at the right. In this age of mechanization perhaps the timberman's axe and saw will suffer the fate of the muck stick.

Simplified Self-Dumping Skip


A
B
SKIP DOOR
ORE POCKET
SKIP IS RAISED. LUG (A) PASSES LATCH (B)
SKIP IS LOWERED SLOWLY. LATCH (B) RAISES SKIP DOOR
SKIP DOOR DROPS
AS SKIP CONTINUES DOWNWARD, LUG (A) CLEARS LATCH, AND DOOR CLOSES

An improved version of a self-dumping skip has been devised by Henry Grynberg, chief mechanic for Cia. Minera Unificada del Cerro de Potosi, Potosi, Bolivia. A model of the skip and a simplified operating sketch are shown above. Full-size skips are being built for use in the company's new Keller shaft. When ore is hoisted, the skip is raised until lug, *A*, engages latch, *B*, and the skip door is opened as the skip lowers. Face of skip is canted back slightly (sketch shows this feature exaggerated for clarity), so that the lug eventually releases from the latch. The door slams shut of its own weight and the empty skip proceeds down the shaft. Older models, used in some Western mines, required an air-operated latch, a full-time operator, and an extra cycle involving the hoisting and lowering of the skip.

Cagers Use Key to Signal Hoistman


TO HOIST HOUSE
DISTRIBUTION BOX
SIGNAL BELL
SIGNAL LAMP
THIS SIGNAL SWITCH CAN ALSO BE USED BY CAGER TO CALL CAGE WITHOUT THE KEY
COPPER
KEY IS MADE OF FIBER
TO LOWER LEVELS
KEY FITS IN HERE
SIGNAL CORD
THIS CONTACT IS OPEN WHEN KEY IS INSERTED
KEY POINT

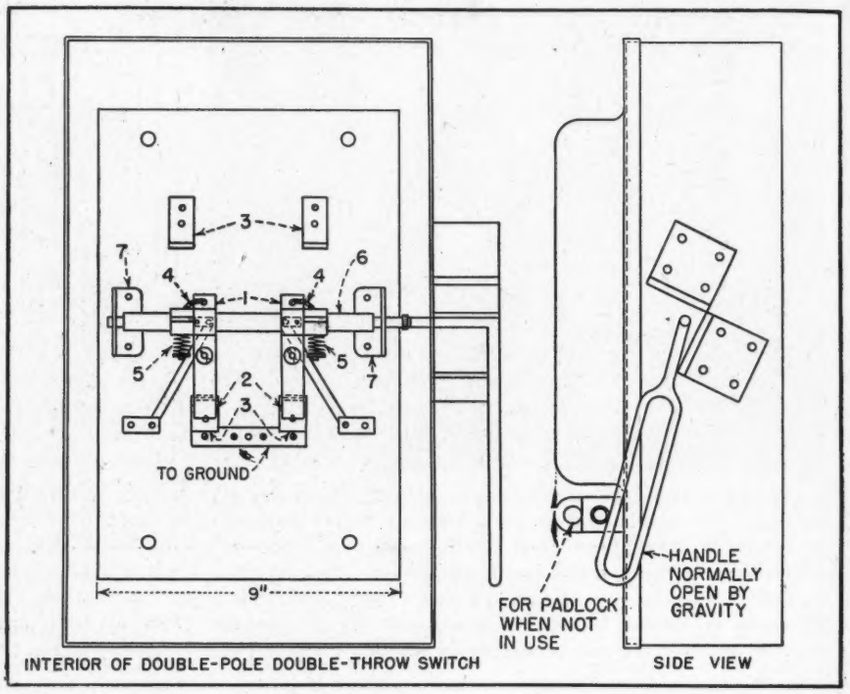
When cagers call the cage at the Fresnillo property, Zacatecas, Mexico, they insert a fiber key into contacts inclosed in a block. Only qualified cagers can direct movement of cages. Formerly a round key was used. However, workmen could close the circuit with a common lead pencil. Consequently a cruciform key was adopted for safety.

Gravity Grounds Safety Switch for Blasting

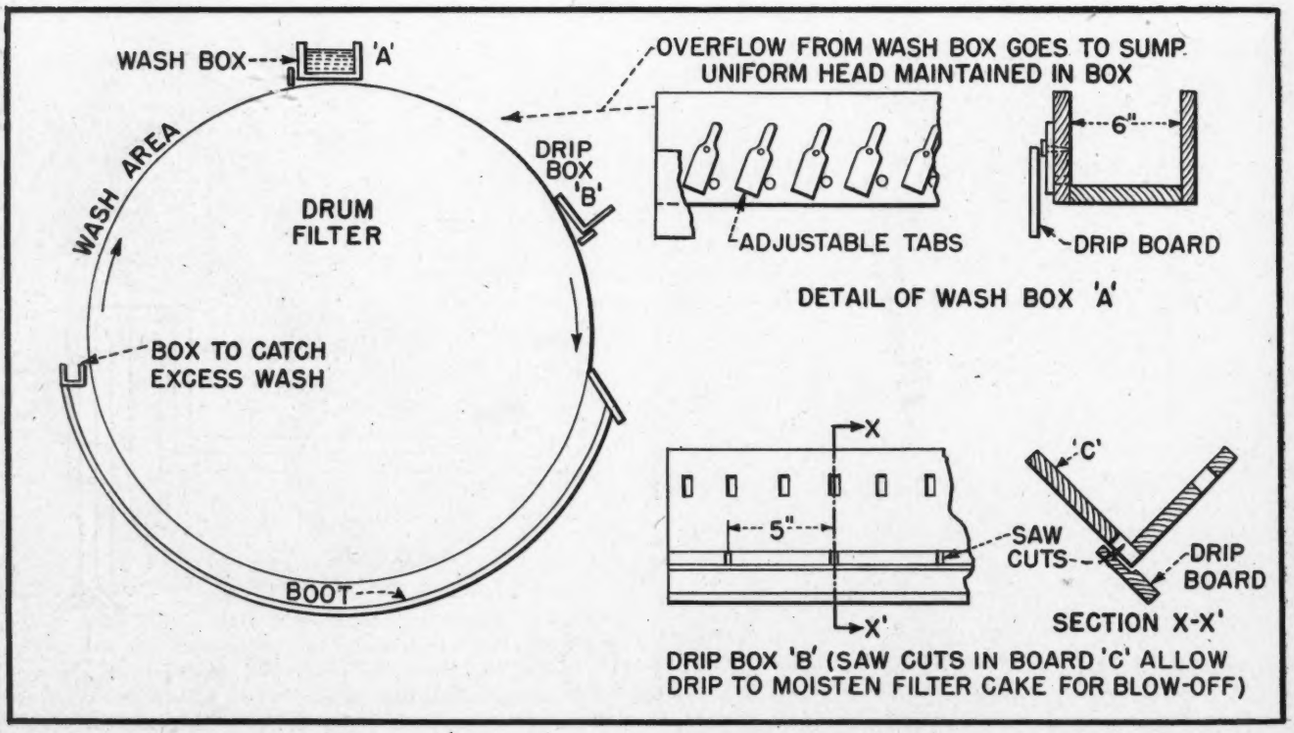
ERIC RUNEHJELM, safety director, Hudson Bay Mining & Smelting Co., Flin Flon, Manitoba, writes that this safety blasting switch was designed to meet the following requirements of the Provincial Mines Act: "Electricity from lighting or power cables shall not be used for firing shots except when a firing device of a design which has been approved by the director, and which automatically opens the circuit by gravity, is provided."

Parts designated on the illustration by number are: 1, support clamps; 2, moving contact fingers; 3, stationary contact tips; 4, flat braided shunt; 5, compression springs; 6, insulated shaft; 7, bearing brackets.

This switch resembles most switches except that a heavier handle is provided, which is normally depressed by gravity. A lock may be attached to prevent tampering when the switch is not in use.



Wash Boxes on Filter Increase Gold Recovery



Dissolved gold is filtered from slimes more effectively with this arrangement of wash boxes on a 11½ x 16-ft. drum filter at the mill of Kerr-Addison Gold Mines, Ltd., Virginiatown, Ontario, according to George Hawkes, metallurgist who submits this sketch. Box A distributes an even film of wash water over the entire rising slime-covered surface of the drum. Tabs over the ⅜-in. holes of the box permit effective control of the wash. The absence of water on the down side of the filter prevents blow-back of gold bearing solution. The 5/16x1-in. holes in box B are drilled on 2-in. centers for acid treatment.

SAFE POWER

ALL DAY...EVERY DAY... *EXIDE-IRONCLAD BATTERIES* KEEP THEM ON THE GO

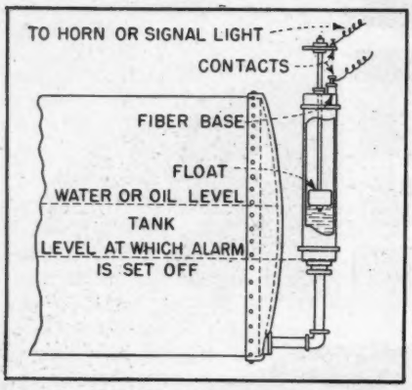
Trammers, locomotives and shuttlecars keep steadily on the job, hour after hour, with full shift availability, when the motive power is supplied by Exide-Ironclad Batteries. That is being demonstrated daily in thousands of mines, quarries and tunnel operations of every kind.

Exide-Ironclads have the *high power ability* that frequent stop-and-go service demands . . . a *high maintained voltage* throughout discharge . . . and the *high capacity* needed to assure peak performance. You can always count on Exide-Ironclad Batteries for dependability, long-life and ease of maintenance . . . plus *maximum safety* and *economy.*

If you have a special battery problem, or wish more detailed information, write for booklet Form 1982.

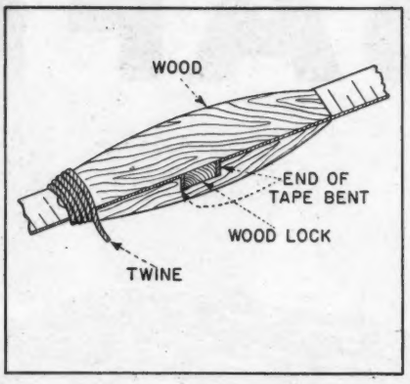
THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

Alarm for Tanks



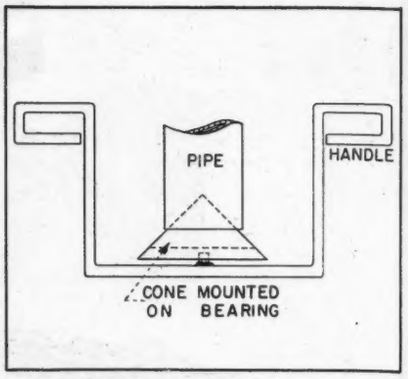
When fuel, water, or reagent tanks in mine plants run low, this simple alarm will notify the operator. It is set to operate a visible or audible warning signal before the tank is completely empty, to give the operator time to correct the condition. The alarm operates electrically.

Tape Repair



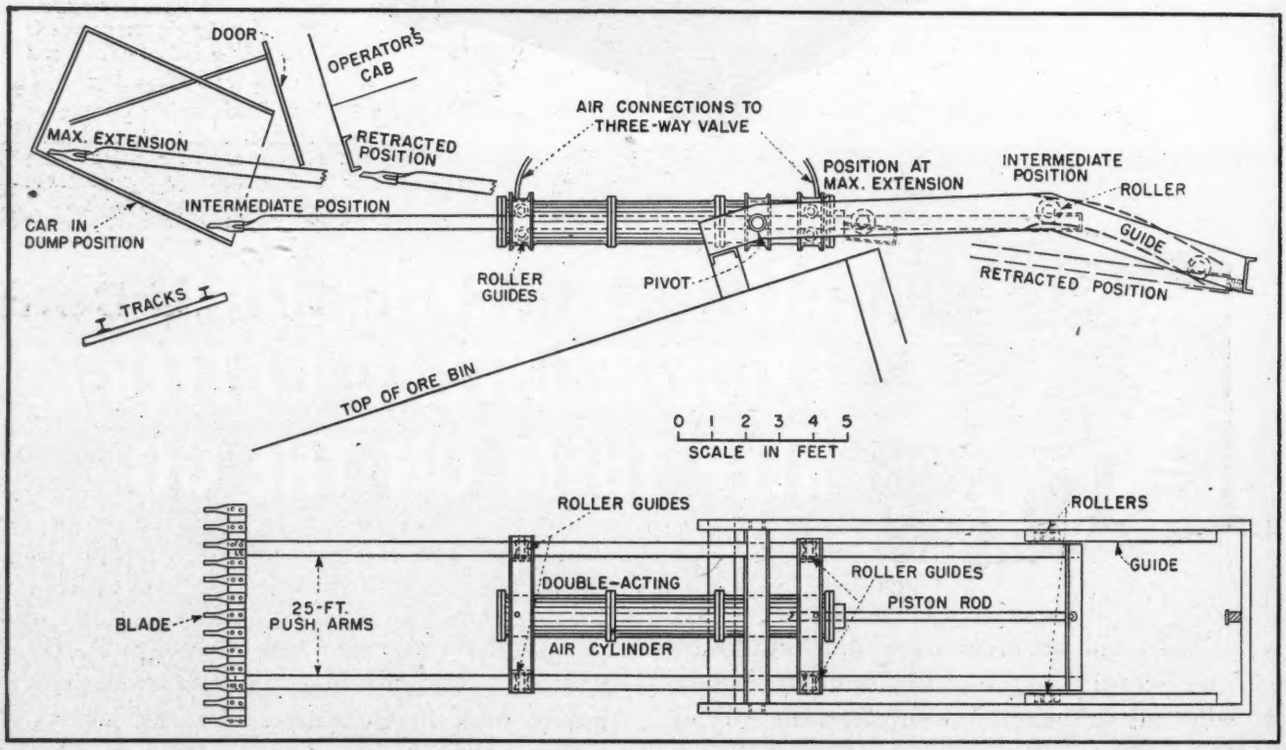
If a survey tape breaks in the field, this repair may come to the rescue. Heat broken ends with a match or cigarette lighter to draw the temper for one quarter inch. Slip ends between blades of a pocket knife and bend. Join the ends as shown above.

Handy Pipe Holder



When screwing on pipe lengths in a mine shaft it is difficult for the man at the lower end to hold up the pipe and permit rotation. This simple handle with a cone mounted on a bearing solves the problem, according to Dick May, Wallace, Idaho, who submits this idea.

Air-Operated Scraper Cleans Mine Cars at Climax



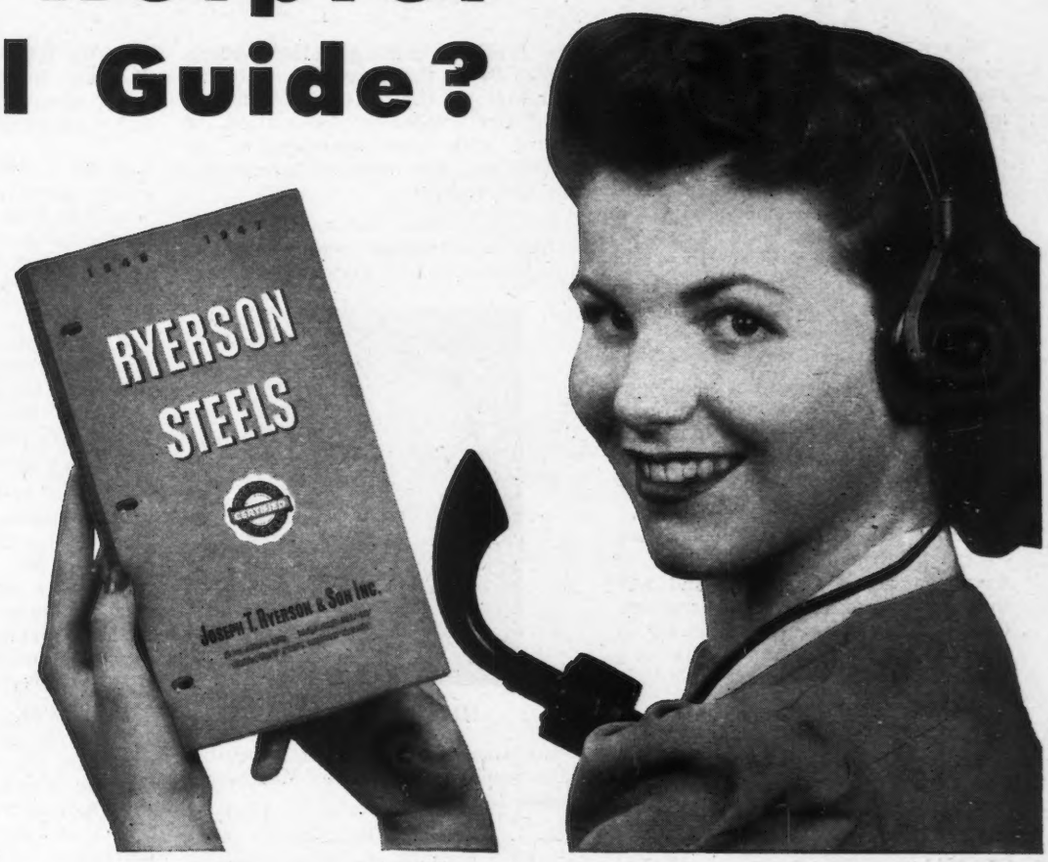
A 20-car train of Granby-type cars can be cleaned of frozen or packed muck in ten minutes with this retractible car cleaner at the Climax Molybdenum Co. property., Climax, Colo. Muck is dislodged from the bottom of the car by a blade fitted with scraper teeth which is pushed into the tilted car by a pivoted double-acting air cylinder. The blade is supported by a rectangular frame which is pushed and pulled by the piston rod of the air cylinder. Roller guides above and below the push arms keep the frame in proper alignment.

A pair of steel guides and rollers at one end of the frame control the initial cleaning stroke so that the blades will engage the car bottom but miss the open car door.

An operator controls the car cleaner through a three-way valve in the cab near the car dump. The cleaning may be done while the trains are being unloaded. Generally one or two thrusts of the blade suffice to clean out a car.

This system is a great improvement over the former method of blasting excess muck out of the car bottoms, and has resulted in an improved car factor. Removal of muck from one side of the car also prevents derailing of the cars.

Are You Using this Helpful Steel Guide?



Complete Stock List and Buying Data for Reference when You Call . . .

Complete information on Ryerson Steel—detailed listing of more than 10,000 kinds, shapes and sizes—ready for your steel buying convenience in the new Ryerson Stock List and Data Book. Also included are pages of time-saving informative data on Average Physical Properties, AISI and SAE Standard Steel Compositions and a wealth of other facts and figures. The book is cataloged to simplify the work of purchasing men, metallurgists, engineers—everyone who specifies, buys or works with steel.

All sizes listed are not always in stock, because of the great demand, but Ryerson continues to carry the country's largest stocks. With the Ryerson Stock List to guide you, one call, one order, one shipment, will often cover a varied group of steel needs.

Copies of the current 1947 edition have been widely distributed, but if you do not have one, contact the Ryerson plant nearest you. And be sure to check Ryerson for all steel requirements. If the exact steel you need is not in stock our experienced staff will be glad to suggest a practical alternate.

Joseph T. Ryerson & Son, Inc. Steel-Service Plants at: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles.

RYERSON STEEL

PERSONAL NEWS

Henry R. Mathias, formerly sales manager of "Engineering and Mining Journal" and "Coal Age," has been appointed general manager of these two mining publications of the McGraw-Hill Publishing Co. by James H. McGraw, Jr., chairman of the company, upon the recommendation of Alfred M. Staehle, publisher. Mr. Mathias has been with McGraw-Hill since 1943 and previously had been with Standard Oil Company of Indiana for 19 years. He is a graduate of the University of Illinois.

Fletcher W. Rockwell has been made chairman of the board of the National Lead Co., with which he has been associated for 50 years. **Joseph A. Martino** has been elected president of the company.

Harold K. Hochschild has been elected chairman of the board of American Metal Co., Ltd., and will continue as president of the company. **Charles E. Stott,** general manager of the company's Mexican operations, has been elected a director.

A. E. ("Art") Bernard, deputy inspector of mines in Nevada for the last six and a half years, has been appointed State Inspector. He succeeds **Matt Murphy,** recently deceased.

J. R. Kirkconnell has been appointed general executive assistant of the Mines and Geology Branch of the Ottawa Department of Mines and Resources, succeeding **L. L. Bolton.**

D. N. Vedensky, of Berkeley, Calif., chief metallurgical engineer for the Pan-American Engineering Co., of Berkeley, since 1932, has been retained by the M. A. Hanna Co. as research engineer to conduct metallurgical research on the beneficiation of iron ores.

Hopkins Fitzpatrick, mine superintendent of North Star Mines Co., Ltd., Grass Valley, Calif., has been made general manager of the company. He succeeds **John C. Mann,** who becomes president. **Fred Searls, Jr.,** formerly president, has been elected chairman of the board of the Empire Star Co., also at Grass Valley.

Roger O. Oscarson has been made manager of the Northwest Mining Association, at Spokane, Wash. He is president and general manager of the Morning Star Mining Co., a gold-silver-copper property in Danville, Wash.

Jacques F. Ledoux, of Paris, France, who is assistant chief engineer in charge of engineering, production, and maintenance of the Société Minière et Metallurgique de Peñarroya at Puertollano, in the Province of Ciudad Real, Spain, was a recent visitor to the Tri-State mining field. Accompanied by **F. F. Netzeband,** of Joplin, secretary of the Tri-State Zinc and Lead Ore Producers Association, he visited with mine operators of the district and also inspected mechanized mining methods.

Henry L. Hill, well-known British Columbia consulting mining engineer and formerly chief engineer for Bralorne Mines, Ltd., has been appointed mine manager for Reeves MacDonald Mines, Ltd.

HENRY L. HILL

A. J. Arland has resumed his practice as a consulting mining engineer following a long period of service with the Royal Canadian Air Force.

C. C. Camp, representing the exploration department of Butler Brothers, St. Paul, Minn., is investigating mining possibilities in British Columbia.

Dr. C. W. Dannatt, professor of metallurgy, Royal School of Mines, London, England, is making a tour of Canada under the Nuffield Foundation.

Wendal D. Ingram of Gridley, Calif., is now associated with Collins Pacific, Ltd., in Vancouver.

Frank C. Pickard, formerly division superintendent for the Fresnillo Co. at Fresnillo, Mexico, is now mine superintendent for Tsumeb Corporation, Ltd., Tsumeb, Southwest Africa, a Newmont-American Metal affiliate.

J. M. Blalock, Jr., has resigned from the staff of Battelle Memorial Institute to become associated with the Baker and Adamson Sales Division of General Chemical Co. He receives mail at 300 Raleigh St., Oxford, N. C.

Sam H. Morris, of Globe, **Charles R. Kuzell,** of Douglas, **Edward Gentzer,** of Greer, and **Mark Gemmill,** of Prescott, have been appointed to new two-year terms on the Arizona State Copper Tariff Board.

C. T. Williams, staff engineer for Cotopaxi Exploration Co., Ecuador, is vacationing in British Columbia prior to his return to South America.

Leslie L. Motz, of Bisbee, Ariz., recently discharged from the Army, where he held the rank of colonel, is now employed as mine metallurgist and engineer by the Kaiser Co., Inc., Iron and Steel Division, at its Vulcan mine, Kelso, Calif.

C. J. Short, former engineer for Shattuck Denn Mining Co., at Bisbee, Ariz., and for numerous South American firms, has joined the staff of the Kaiser Co. mines in California.

Howard W. Adam has been named to the staff of Battelle Memorial Institute, Columbus, Ohio, where he will be associated with its minerals research division. Mr. Adams is a veteran of three years' service in the Navy. He is a graduate of the Montana School of Mines and holds a master of science degree from the Massachusetts Institute of Technology.

Dr. J. Willis Ambrose was on March 11 elected president of the newly organized Geological Association of Canada, which followed a meeting of the Prospectors and Developers Association in Toronto. Dr. Ambrose is an alumnus of Stanford and Yale and was from 1935 to 1945 on the staff of the Geological Survey of Canada. Since 1945 he has been in private consultation work and special lecturer in geology at Queen's University, Kingston, Ont.

Harold L. Walker, of Urbana, Ill., recently appointed State Mines and Minerals Director by Governor Green, was unanimously confirmed by the Illinois State Senate on April 9. He succeeds **Robert M. Medill,** resigned.

George C. Bartholomees, presently mining engineer with St. Joseph Lead Co. at Bonne Terre, Mo., has been loaned to the Sociétè des Mines de Zellidja, Bou Beker, French Morocco (near Oujda), to organize a program of mechanization of the mine. The present 350-ton production is to be increased to 1,200 tons daily by means of pneumatic-fed jackhammers and mechanical shovels and scrapers. The product is galena and lead ores in dolomite.

Maj. D. E. S. King, an Associate of the School of Mines and Metallurgy (British), and former Mining Engineer for the Gold Coast, has been appointed to the Colonial Service as Inspector of Mines for Nigeria.

Dr. James A. Noble, chief geologist of the Homestake Mining Comp-

WILL THE SAME CONVEYOR BELTING HANDLE BARLEY, BRICK AND BRIMSTONE?

YOUR THERMOID DISTRIBUTOR* WILL KNOW

The price you pay for conveyor belting should be based on the service conditions it must meet. To get the belting that's just right for your work, consult your Thermoid distributor. Tell him what is to be moved and he will be able to specify the most economical belting for the job.

He can also tell you—

That Thermoid conveyor and elevator belting is carefully built for the service each is recommended and sold for. He will be able to tell you that impressive records of trouble-free operation have been made by Thermoid beltings largely because each type is designed and made with a thorough understanding of the wear factors in the service specified.

He knows something about Thermoid too—

Thermoid concentrates its manufacturing for industry on the well integrated line as shown below. The Company itself, while large enough to be thoroughly reliable, is still small enough to keep active contact with customers and their problems. That's one of the reasons why—

IT'S GOOD BUSINESS TO DO BUSINESS WITH THERMOID!

* A postcard or a letter to the factory will bring his name and address to you.

Manufacturers of new equipment are invited to correspond direct with the home office.

Thermoid
INDUSTRIAL RUBBER PRODUCTS
BUILT FOR THE JOB
QUALITY VALUE SERVICE

THE THERMOID LINE INCLUDES: INDUSTRIAL BRAKE LININGS AND FRICTION PRODUCTS • TRANSMISSION BELTING • F.H.P. AND MULTIPLE V-BELTS AND DRIVES • CONVEYOR BELTING • ELEVATOR BELTING • WRAPPED AND MOLDED HOSE.

Thermoid Products

AUTOMOTIVE • INDUSTRIAL
OIL FIELD • TEXTILE

THERMOID COMPANY, TRENTON, N. J., U. S. A.

any, has been appointed professor of metalliferous geology on the staff of the Division of Geological Sciences of the California Institute of Technology. He succeeds **Dr. Horace J. Fraser**, who is now general manager for Falconbridge Nickel Mines, Ltd., Falconbridge, Ont.

Dr. Robert P. Sharp, an alumnus of the California Institute of Technology and of Harvard, after holding the chair of assistant professor of geology at the University of Illinois for four years and then serving three years with the Arctic Section of the A.D.T.I.C. unit of the Army Air Forces, will join the faculty of the California Institute of Technology in September as professor of geomorphology. Dr. Sharp was recently professor of geomorphology at the University of Minnesota.

M. H. Kuryla has been elected president of the United States Smelting, Refining & Mining Co., succeeding **N. W. Rice**, who will continue as chairman of the board.

William G. Mather, who is 89 years old, recently resigned from the boards of directors of the Cleveland-Cliffs Iron Co. and the Cliffs Corporation of Cleveland, Ohio. Mr. Mather has been associated with the iron and steel industry for 70 years.

Arthur F. Evans has been appointed assistant general superintendent of Electrolytic Refining & Smelting Co. of Australia Pty., Ltd., at Port Kembla, New South Wales.

J. P. Murrie has been appointed plant superintendent of the Broken Hill Associated Smelters Pty., Ltd., Port Pirie, South Australia. He was previously general superintendent with Electrolytic Refining & Smelting Co., Ltd., at Port Kembla, New South Wales.

Dr. J. K. Gustafson is expected in Australia to undertake consulting work on behalf of the Zinc Corporation and associated companies at Broken Hill, New South Wales.

H. E. Edwards has been appointed general manager of Renison Associated Tin Mines, N. L., at Renison Bell, Tasmania. He was previously on the staff of Big Bell Mines, Ltd., Cue, Western Australia.

Dr. B. H. Moore, formerly director of the Kalgoorlie School of Mines, Kalgoorlie, Western Australia, and a noted research metallurgist, died on January 6, 1947.

E. T. Stannard, president, with **Arthur Paige** and **Robert L. Coe**, directors, of the Kennecott Copper Corporation, lately returned to New York following inspection of properties of the Nevada division in White Pine County, Nev.

Malcolm A. Porter, of the sales department of the explosives division of the E. I. Dupont Co., at Billings, Mont., has been transferred to the technical service section of the same company at Wilmington, Del. He was succeeded at Billings by **Walter L. Crow**, Wilmington, Del., recently with the armed services.

A. R. O. Williams of the Consolidated Goldfields of South Africa's London office, has been appointed a director of the Indian Copper Corporation.

Freeport Sulphur Co. has acquired assets of the estate of the late **U. C. Tainton**, metallurgist and inventor, and will carry on research and development work at the Tainton laboratory in Baltimore. Operations will be continued by the present technical staff as a new division of Freeport, to be called Tainton Products Co., under the direction of **Charles D. G. Breckinridge**, manager. Mr. Tainton, who died in 1945, was the inventor of the process that bears his name for production of electrolytic zinc, of electrogalvanizing of steel products, of metal cleaning processes, and of various other processes and products.

George R. Powe, formerly assistant geologist with the Northern Pacific Railway, at Billings, Mont., has been transferred to the Roslyn, Wash., office of the Northwest Improvement Corporation, a Northern Pacific subsidiary.

C. B. Foster, formerly in Korea and more recently in Brazil, has been appointed general superintendent of the Lepanto Consolidated Mining Co., Mankayan, P. I.

Bert C. Austin, well-known San Francisco mining engineer, has been named chairman of the mining committee of the San Francisco Chamber of Commerce.

The new directors and officers of Arctic Circle Exploration, Inc., are **Russell E. Havenstrite**, president and director; **John B. Havenstrite**, vice president and director; **John C. Gillham**, secretary and director; **William A. Dieppe**, treasurer and director; and **Jack Allen**, director.

Capt. Garland Peyton, who has served as director of the Department of Mines, Mining, and Geology of Georgia, through three administrations, was reappointed by Acting Governor M. E. Thompson.

Douglas Parent, consulting engineer long associated with mining operations in the northwestern areas of Quebec and recently on the staff of Quebec Gold Mining Corporation, has been made resident manager of Buffadison Gold Mines, operating in northwestern Quebec.

William G. Maloney, mining engineer, formerly Montana Inspection Supervisor of the Wage and Hour Division of the Department of Labor, has resigned that position and has been appointed Director of the Montana offices of U. S. Department of Commerce, with headquarters in Butte.

E. C. Andrews, formerly government geologist of New South Wales, has been awarded the Mueller Medal by the Australian and New Zealand Association for the Advancement of Science.

Maurice A. Mawby, of Zinc Corporation, Ltd., New South Wales, has been made a director of that company's exploration and research, and will supervise an extensive prospecting campaign.

D. Humphries, lately inspector of mines at Broken Hill, New South Wales, has been appointed mine manager of the Blue Asbestos Co., at Wittenoom, in the Hamersley Ranges, Western Australia.

W. L. Zeigler, millwright and general mill superintendent for the Hecla Mining Co., accompannied by **Fred Pringle**, Hecla metallurgist, have left the Coeur d'Alenes district of Idaho for French Morroco, where they will supervise the erection of a modern flotation plant for Newmont Mining Corporation, which is associated the French firm of Sociétie des Mines des Zellidja. The mining property, on which they will erect a 1,000-ton plant, is near Oran, on the Algerian border, and is an old mine which was crudely operated hundreds of years ago.

G. S. Ferguson has resigned from his position as maintenance foreman with the Phelps Dodge Corporation in Clifton, Ariz., after 30 years' service.

Harold Maryott has accepted a position as general manager of the Comstock Extension Mining Co. which is operating the Irene mine near Globe, Ariz. Maryott was formerly chief mining engineer for the Miami Copper Company.

Roger W. Straus has been elected chairman of the board of American Smelting & Refining Co., succeeding **Francis H. Brownell**, who had requested to be relieved because of age. Mr. Brownell continues as a director and as chairman of the finance committee. **H. Y. Walker**, formerly senior vice president, succeeds Mr. Straus as president, and **Kenneth C. Brownell**, formerly vice president, assumes the new office of executive vice president. **R. F. Goodwin**, vice president, has been named to the board of directors to succeed the late H. A. Guess.

Robert W. Wilson, of Pasadena, Calif., has gone to Honduras where he is in charge of Mina L. Mochito of the New York & Honduras Rosario Mining Co. at Mochito, via Jaral, Honduras, C. A.

Edward B. Wilber, district sales manager of the Aluminum Company of America, has for the second consecutive year accepted the chairman-

ship of the Non-Ferrous Metals Division of The Legal Aid Society's Appeal. The Society is asking for $200,000 to continue to provide free legal advice and representation to those otherwise not able to afford the services of an attorney.

Dudley D. Homer, managing director of the South American Metal Co., a subsidiary of the American Metal Co., Ltd., of New York, is residing in Santiago, Chile. He may be addressed at Casilla 125-D Santiago.

J. G. Brittingham has been appointed general superintendent of the works of Electrolytic Refining & Smelting Co. Pty., Ltd., Port Kembla, New South Wales.

A. R. West, latterly underground manager of North Broken Hill Ltd., Broken Hill, New South Wales, has been appointed manager of the company's mine, in succession to **Keith A. Cameron.**

G. B. O'Malley, technical representative of North American Cyanamid, Ltd., has returned to Australia after six months' absence overseas, during which he visited the mining fields of United States, Canada, and the Philippine Islands.

Corrections

The interval between haulage levels at the Fresnillo mine, Zacatecas, Mexico, is 135 m., instead of 35 m., as published in *E.&M.J.*, April 1947, page 90. The first sentence on page 91 of the same issue should read: "In loading holes, the primer cartridge is placed in the bottom of the hole."

OBITUARIES

Simon I. Patiño died at Beunos Aires, Argentina, on April 20 at the age of 84. He was president of Patiño Mines & Enterprises Consolidated, operating tin mines in Bolivia, and head of Consolidated Tin Smelters, Ltd.

John Atkins Payne, president of Consolidated Coppermines Corporation, died at Woodbury, Long Island, on April 18, at the age of 47.

George W. Padbury, Sr., 88, died at Helena, Mont., on March 29.

Robert Montague Ross, 37, former Tennessee Valley Authority geologist, died March 23 in Nashville, Tenn.

Howard R. McBride, 73, for many years an executive of the Bunker Hill and Sullivan Mining companies in Kellogg, Idaho, died March 22 in Spokane. Mr. McBride was a Spanish-American war veteran and a former Idaho legislator.

William Berryman Scott, geologist, author, and paleontologist, died at Princeton, N. J., on March 29, at the age of 79. Dr. Scott was a graduate of Princeton University and became professor of geology at that institution in 1884. He had been in retirement since 1930.

George Davis Barron, mining engineer, who had been associated with the industry since 1886 and who had owned and operated mining properties in Mexico, died at Rye, N. Y., on April 1, at the age of 87. He was graduated from Washington University, at St. Louis, and had been a director of the Engineering Foundation and the A.I.M.E., and was treasurer of the Institute from 1918 to 1922.

A. G. Wood, mechanical engineer for Pickands, Mather & Co. on the Gogebic Range, in the Michigan Iron Country, died in Duluth on March 7.

Harbour Mitchell, Vice President of E. J. Lavino & Co., Philadelphia, Pa., died suddenly after a brief illness on Sunday, March 23, at his late residence, 144 Valley Road, Ardmore, Pa. He was born in Wheeling, West Virginia, in 1886, and was the son of the late Alexander Mitchell and Delhia G. Harbour Mitchell. He graduated as a mechanical engineer from the University of West Virginia. He was connected with the American Foundry and Construction Co., Pittsburgh, Pa., from 1908 to 1923, and was vice president of E. J. Lavino and Co. from 1924 until his death. He was president of Compañia Cubana de Minas Y Minerales, S. A., Havana, Cuba, and vice president of Lavino Shipping Co., Philadelphia.

C. A. Caldwell, 76, former professor and head of the department of mining engineering at Case School of Applied Science, died at his home in Cleveland March 27.

Frederick Keffer, 85, died March 12, at Spokane, Wash. In 1907 he was president of the Canadian Institute of Mining and Metallurgy, and was elected an honorary life member of the Institute in 1925, the only other American so honored being Herbert Hoover. Mr. Keffer had been prominent in the Columbia Section of the American Institute of Mining and Metallurgical Engineers of which he was also a member.

Charles A. Grabowsky, 74, died at Eveleth, Minn., April 9. He was long associated with Oliver Iron Mining Co.

LETTERS

Suspended Arch Development

To the Editor:

In the very informative article which Professor Hayward wrote for your February issue on non-ferrous metals it would appear that Noranda Mines, Ltd., was the only plant utilizing the suspended basic arch. At present all copper and copper-nickel reverberatories in Canada use the Detrick Suspended Basic Arch . . . and these consist of the following: Noranda Mines, Ltd., 2; Hudson Bay Mining & Smelting Co., 2; International Nickel Co. of Canada, Ltd., 9.

In the CANADIAN MINING JOURNAL for May 1946 the following statement appears on page 434:

"Since the introduction of suspended magnesite roofs no major shutdowns have been necessary for roof repairs. This has proved to be of great value during the past six years when operations were at capacity. It is estimated that the continued use of the sprung silica roofs, with a life of 90 days on the firing end, would have involved a loss of more than 1,000 furnace-days during the period."

We would appreciate it very much if you would arrange to publish the above facts in an early issue to correct any misinterpretation of Professor Hayward's remarks.

C. F. POLLEN

Sales Manager,
M. H. Detrick Co.,
Chicago, March 17, 1947

To the Editor:

In my review of Non-Ferrous Metallurgy published in your February issue, page 112, I used the term "suspended arches of magnesite brick developed at Noranda." This has been interpreted by one reader to mean that this procedure originated at Noranda and by another that only Noranda uses this method. Neither of these is true nor intended to be so construed, and I hasten to correct the impression.

The trials of the famous Carson side-feeding case showed how hard it is to prove where a certain technique was first used, but the records seem to show that suspended magnesite arches were first used at the Flin Flon smelter, and it is well known that several other companies have tried them.

It cannot be denied, however, that Noranda has done much to "develop" the use of suspended magnesite arches, and my statement was not in serious error. I am glad to give Flin Flon the credit for preceding Noranda in using this technique and for substantial contribution to its development.

This gives me another opportunity to repeat what I have said on several occasions—viz., that metallurgists are in great debt to the Noranda staff for so freely publishing the results of their work.

CARLE R. HAYWARD

Professor of Process Metallurgy (Emeritus), Massachusetts Institute of Technology, Cambridge, Mass., March 24, 1947.

EQUIPMENT NEWS

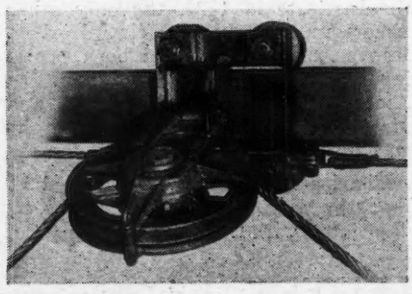
Testing 40-Ton Truck on Iron Range

GIANT AMONG HEAVY-DUTY TRUCKS that carry the load "on their backs," this newest Euclid unit has payload capacity of 40 tons and is powered by a 12-cylinder, 550-hp. Cummins diesel engine. This particular truck is the only one of that size yet built by the manufacturer, Euclid Road Machinery Co., Cleveland 17, Ohio. It is shown, in experimental service, under the 6½-cu. yd. dipper of an electric shovel at M. A. Hanna Co.'s Mississippi mine, on the Mesabi iron range. An idea of the size of the truck is suggested by the 5½-ft. diameter tires and by the ladder required to reach the cab.

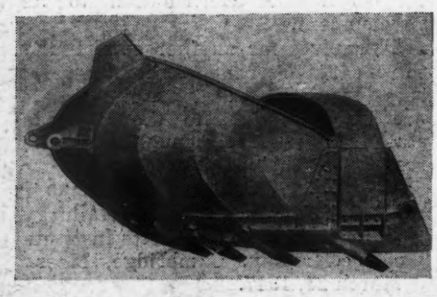
Scraper and Tail Block

Largest of the Crescent scraper buckets made by Sauerman Bros., Inc., 584 South Clinton St., Chicago, Ill., is the new 15-cu.yd. "Mammoth" now in use for open-pit mining, stripping, levee construction, and similar work. Because of refinements in cutting lines and because of its reduced weight-strength ratio, the new scraper can be operated by a power unit scarcely larger than that required for the older 12-yd. scrapers. The unit, like the other Crescent models, is designed mathematically for penetrating power and strength.

Latest in trolleys for carrying scraper tail blocks on monorails, is said to be Sauerman's new trolley,



pictured herewith. It rides on four double-flanged steel wheels, and is adaptable to hand or power shifting.

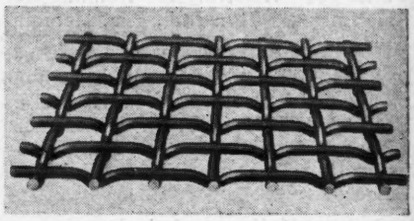


Rubber-Coated Gloves

Rubber-coated canvas gloves of improved wearing qualities are now being manufactured by U. S. Rubber Co., Providence, R. I. The canvas gloves are dipped in liquid rubber up to the wrist, then vulcanized.

Flat Screen Cloth

Refinements in manufacturing techniques now make it possible for John A. Roebling's Sons Co., Trenton 2, N. J., to produce wire screen in coarse-mesh sizes that provides true precision openings and also presents a flat sur-



face to the flow of material being screened. Called Roe-Flat, the new screen cloth has a life up to 90% longer than conventional type of cloth, because wear is so evenly distributed over the screen surface. Clogging and blinding is said to be greatly reduced, and the new screen is said to be an excellent supporting surface for fine-mesh screen.

Dust Control

A solidified wetting compound for dust control that apportions itself automatically into water lines has been developed by Johnson-Marsh Corporation, 52 Vanderbilt Ave., New York 17, N. Y. Applied to the water line in cartridge form, the compound dissolves in proportion to the water passing it. The unit is designed for over 100-lb. pressure and requires no adjustment or servicing.

Roof Ventilator

A propeller-type fan is used in the new roof ventilator of the Swartwout Co., Cleveland, Ohio, to exhaust heat, smoke, or fumes through the divided top of the unit, which opens and closes automatically. The ventilator is weather-tight at all times. Descriptive bulletin, No. 323, is available.

Monoxide Detector Tubes

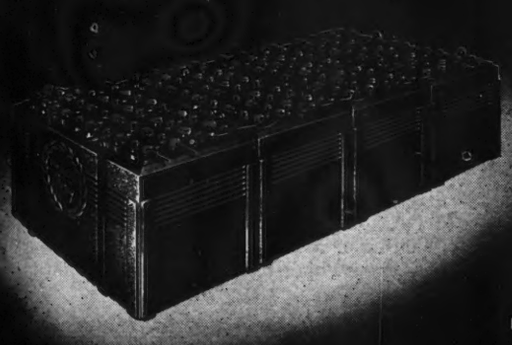
Manufacture of the carbon monoxide detector tubes, invented and made exclusively during the war by the National Bureau of Standards in Washington, has been placed on a peacetime footing through sale of the Bureau's equipment to Mines Safety Appliance Co., Pittsburgh, Pa. The color indicator used in the relatively inexpensive device is a yellow silica gel impregnated with a complex silicomolybdate compound, catalyzed by

Extra Power for Extra Production

Mechanized mining scored one of its greatest gains when Philco pioneered the modern extra capacity storage battery.

Extra power to haul more tons per shift—day in and day out! 10% or more additional capacity in the same space!

The great new Philco "Thirty" Mine Battery has this modern extra capacity advantage. In addition it gives longer life under the toughest operating conditions. Write for specification data.



PHILCO

STORAGE BATTERIES

PHILCO CORPORATION • STORAGE BATTERY DIVISION • TRENTON 7, NEW JERSEY

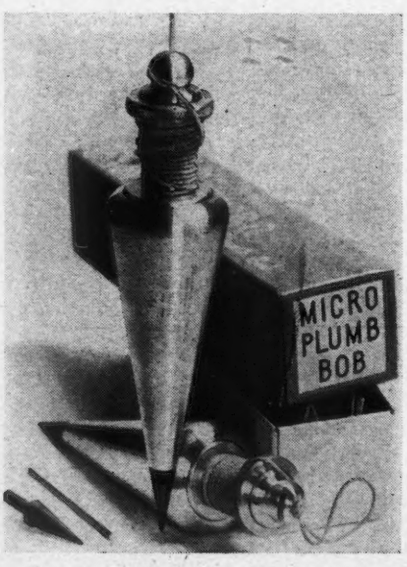
means of palladium sulphate. The yellow indicator turns green if carbon monoxide is present, the degree of green indicating the quantity of the gas.

Geiger Counters

Widespread interest in use of the Geiger-Mueller tube as a detector for radioactive minerals in prospecting and for other purposes has led to the manufacture of improved versions by at least two firms: North American Phillips, Inc., 100 East 42d St., New York 17, N. Y.; and Geophysical Instrument Co., 1820 N. Nash St., Arlington, Va. The former offers a tube mounted in a cabinet in such a way that it can be removed for scanning areas for radioactivity. It is battery-powered and weighs 17 lb. complete. The latter company offers an all-metal tube that is said to withstand rough handling better than the glass type. It is intended, apparently, for laboratory use, and several technical improvements are claimed for it. Details on both tubes will be furnished by the manufacturers.

Well-Designed Plumb Bob

A quick-acting, precise plumb bob of unusual design was announced recently by Suverkrop Instruments Co., Box 436 Bakersfield, Calif. Chief new element is the built-in reel, which



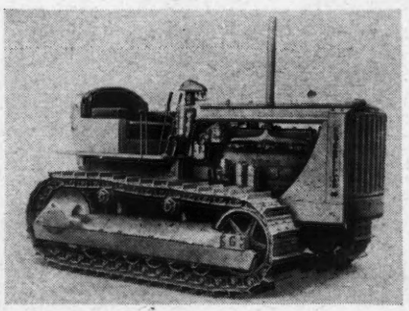
holds sufficient cord so that the plumb bob can be suspended accurately on any point up to 30 ft. below the point of suspension.

In use, the cord is reeled off to the approximate length wanted, then is slipped into the hook, which centers cord on plumb bob. The bob can then be minutely adjusted up or down simply by rotating the spool. When not in use, the plumb-bob spool and hook hold the cord neatly and securely.

Made of dense forged brass, with steel point, the plumb bob has been carefully engineered and field-tested, the manufacturer states. Sizes furnished are 10, 12, 14, and 16 oz. The price is $5, post paid anywhere in the United States. Price includes cord and additional point.

Engines and Tractors

Production of two new diesel engines and two new track-type tractors is announced by Caterpillar Tractor Co., Peoria, Ill. Powered by the new engines, the tractors, and two new



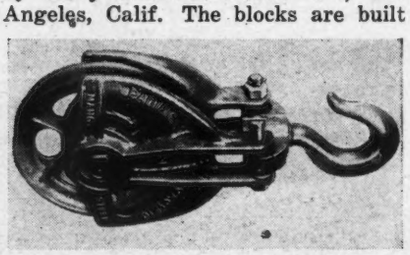
motor graders, offer increased power, improved design, and new and stronger materials.

One-third greater power output is obtained from the new engines, the four-cylinder D-315 and the six-cylinder D-318, used in the new D-4 and D-6 tractors, respectively. The former engine delivers 70 hp. and the latter, 105 hp. The D-6 tractor is shown herewith.

Used as industrial units, the new engines are said to be capable of handling jobs not recommended for former models; and the tractors permit higher working speeds or larger working loads than were possible with the models they replace. Full details of the many design improvements offered will be furnished by the manufacturer.

Quick-Opening Sheaves

Designed for heavy-duty mine and construction work, a new line of quick-opening sheave blocks is now offered by Alloy Steel & Metals Co., Los Angeles, Calif. The blocks are built



with manganese steel sheaves and side plates and are equipped with anti-friction sealed bearings. Sheave rims are recessed into the side plates to prevent rope fouling, and the throat of the block is wide enough to pass a square knot in wire rope. These Pacific Type "C" blocks come in 8-, 10-, and 12-in. sizes.

Splash-Proof Motors

Splash-proof synchronous motors for constant-speed drives up to 1,000 hp. are now available from Electric Machinery Mfg. Co., Minneapolis 13, Minn. Stator frame is said to be without excessive weight and strong as steel. Inspection and maintenance are simplified. Ventilation is afforded by a blower on each end of the rotor. The motors are available in unity or leading power factor.

Going Down

The modern high-speed elevator shown in the accompanying photograph has been installed by Otis Elevator Co. in the Willow Grove mine of Hanna Coal Co., St. Clairsville, Ohio. Object of the installation was twofold to provide an extra escape point and to cut portal-to-portal time. From the original portal, the men walked

four miles to the working faces. Now they descend in the elevator, walk through a concrete-lined corridor, push through a revolving door, and are right there at the coal seam. The revolving door helps control ventilation. Use of the elevator is only a part of the Hanna company's general plan for modernizing employee facilities.

Air-Cooled Compressors

A complete new line of two-stage air-cooled air compressors has been announced by Sullivan Division of Joy Manufacturing Co., Oliver Bldg., Pittsburgh 22, Pa. Called "Unitair" compressors, the new line comes in nine sizes with power requirements ranging from 15 to 100 hp. and piston displacements from 81 to 590 c.f.m. at 100 hp. and piston displacements from 81 to 590 c.f.m. at 100 psi. discharge pressure. The three standard electric drives include: built-in motor, direct-connected motor, and V-belt drive. They may also be used with gasoline or diesel engines. These compressors, which have wide application

in small plants, foundries, or for standby service, are described in Bulletin GG-5A of the company.

Glass-Blowers' Goggles

Glass workers can eliminate the sodium yellow flare that obscures the work in glass-blowing by wearing the new AO Didymium lenses recently announced by American Optical Co., Southbridge, Mass. These lenses are available for spectacle or cup-type goggles and will absorb 90% of the yellow sodium flare present when glass is held in a flame.

Rubber-Tired Mining

Designed for use in coal mines, but exhibiting features useful in metal mines, a new permissible rubber-tired mine tractor has been announced by

Baker Industrial Truck Division of the Baker Raulang Co., Cleveland 13, Ohio.

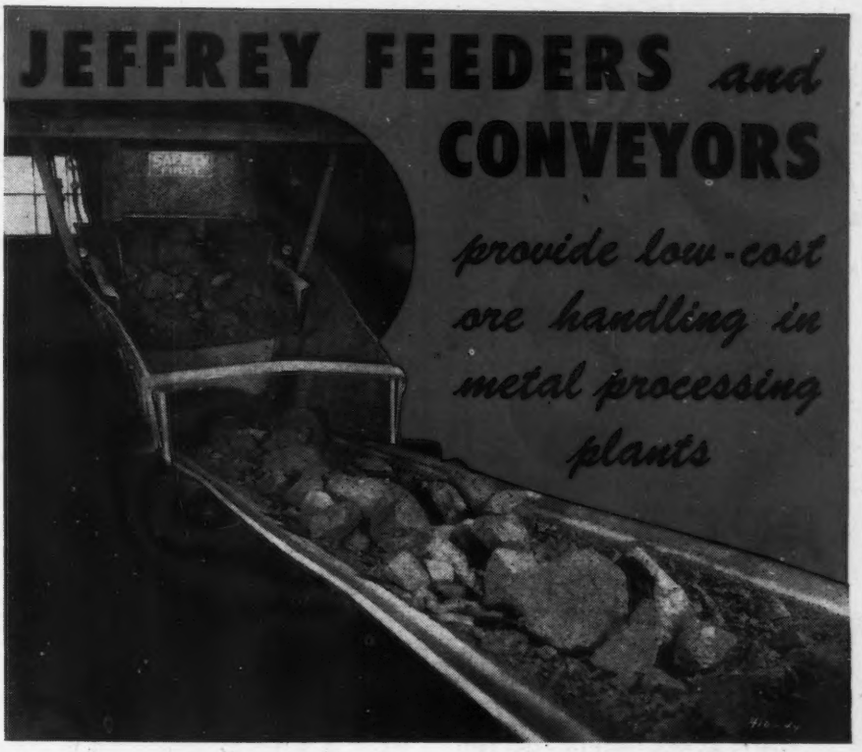
Purpose of the new truck is to free mine haulage from the restrictions of track operation and to increase production. The tractor shown is used with various trailers to haul coal, ore, and supplies, or to transport personnel. In coal mines such units are used as feeders for main-line haulageways. They are powered by storage batteries.

High-Power Rectifier

A new 400-amp. sealed Ignitron, Type GL-507, which is part of a line of tubes for high-power rectifier service, has been made available by the Tube Division of General Electric Co., Syracuse, N. Y. This Ignitron represents an extension of the line, which has heretofore included only 100- and 200-amp. tubes. Primary application of these tubes is in power rectification for mining, electrochemical, transportation, steel, and other industries.

Tractor Cable Control

To provide a lower cost, rear-mounted, double-drum cable control unit for use with Caterpillar D6 and D7 tractors, the Caterpillar Tractor Co., Peoria, Ill., is now producing a new cable control unit, No. 23, which is designed to meet service requirements in operation of scrapers, bulldozers, and rippers. The multiple



● Shown is a Jeffrey-Traylor electric vibrating Feeder discharging into a belt conveyor. This method of handling provides a continuous, uninterrupted flow of material from one operation to another. Saves both labor and time.

Jeffrey-Traylor feeders (patented) provide absolute control over feeding operations . . . are manufactured in sizes ranging in capacity from but a few ounces to many tons per hour. Rate can be changed at will while unit is running. Also electric vibrating screens, conveyors, dryers and coolers.

Jeffrey belt conveyors are being used extensively both on the long hauls for delivering ore bearing rock to processing plant and in the plant for handling material between operations. They are engineered to meet job conditions and the designs are the result of long experience and actual contact with all kinds of operations in practically every field.

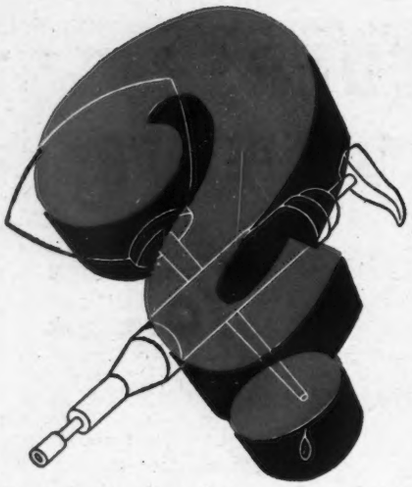
Jeffrey has the engineering experience and plant facilities to help you on both your mining and material handling difficulties.

CONVEYORS • BUCKET ELEVATORS
FEEDERS • CAR PULLERS
CHAINS AND TRANSMISSION MACHINERY

JEFFREY ....ESTABLISHED 1877

THE JEFFREY MANUFACTURING COMPANY
974-99 North Fourth Street, Columbus 16, Ohio

Baltimore 1	Chicago 1	Detroit 13	Jacksonville	Pittsburgh 22
Birmingham 3	Cincinnati 2	Harlan	Milwaukee 2	St. Louis 3
Boston 16	Cleveland 13	Houston 5	New York 7	Scranton 3
Buffalo 2	Denver 2	Huntington 10	Philadelphia 3	Salt Lake City 1



GREASE OR OIL

The question of selection of the proper type and consistency of lubricants need offer no problem. LUBRIPLATE Lubricants are available from the lightest fluids to the heaviest grease types. All reduce friction and wear, protect against rust and corrosion, and are more economical than conventional lubricants. Let us prove our case.

℞ FOR YOUR MACHINERY

No. 2 — Ideal for general oil type lubrication, ring oiled bearings, wick feeds, sight feeds and bottle oilers.

No. 8 — Because of high film strength and long life it reflects outstanding performance in most types of enclosed gears (speed reducers).

No. 107 — One of the most popular grease type products for general application by pressure gun or cups.

No. 70 — For a wide range of grease applications, especially at temperatures above 200 degrees F.

No. 130-AA — Known nationwide as the superior lubricant for open gears, heavy duty bearings, wire rope, etc.

BALL BEARING — This is the LUBRIPLATE Lubricant that has achieved wide acclaim for use in the general run of ball and roller bearings operating at speeds to 5000 RPM and temperatures up to 300 degrees F.

LUBRIPLATE

FISKE BROTHERS REFINING CO.

NEWARK 5, N. J. TOLEDO 3, OHIO

DEALERS FROM COAST TO COAST

CONSULT YOUR CLASSIFIED TELEPHONE BOOK

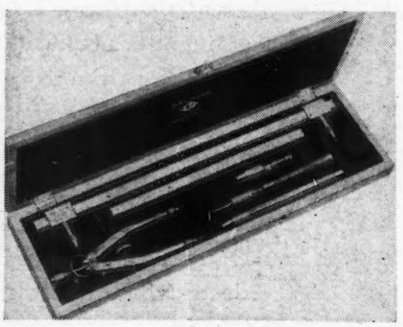
disk-type clutch and other features of the company's No. 25 and No. 24 type controls are included.

Borehole Surveys

Inclination and direction surveys of boreholes are said to be simplified through use of a device invented by Messrs. Trotter and Pajari, 82 Baker St. Sudbury, Ont. The instrument can be used with either AX or EX drills. It is fitted into brass drill rods, hooked into the line of steel rods and lowered into the hole. At a predetermined time, the magnetic needle and the protractor pin are locked, and when the instrument is removed, the readings are easily taken. Improved accuracy is claimed for the device, as well as an increase in speed of surveying. These instruments are supplied on a rental basis to those interested.

Unusual Drawing Set

Instruments in the new drawing set recently announced by Charles Bruning Co., Inc., Chicago 41, Ill., include: a beam compass, with 8- and 13-in. beams; a 6-in. bow compass; a ruling pen with club-style wood



handles; and a draftsman's refillable pencil that can be converted into a double-end pencil. Adjustment of the beam compass is by a patented thumb-operated lock. Similarly patented is the feature of the ruling pen that calibrates the thickness of line so that lines can be duplicated after cleaning or refilling pen. Other exclusive features are found on the pencil and compass. The company describes the set as moderate in price and high in quality.

Cast-Iron Electrode

Nicast is a new P&H electrode, which is said by the manufacturer to put cast iron in a class with steel for ease of welding and finishing. Operating on either a.c. or d.c., the electrode produces welds that are strong, nonporous, and fully machinable. It can be used for repairing broken castings, building up worn castings, and welding cast iron to steel. Most applications do not require preheating or postheating. For details, write Harnischfeger Corporation, Welding Division, Milwaukee 14, Wis.

Electronic Controller

Translation of the readings of electrical instruments into movement of valves, feeders, or other metallurgical devices is something of a problem. One solution could probably be found in an electronic servo-mechanism manufactured by W. C. Robinette Co., 802 Fairoaks Ave., South Pasadena, Calif. This apparatus, somewhat complicated in nature, provides delicate mechanical motion in response to instrument readings, pressure gages, flowmeters, weighing machines, and the like. For specific applications, consult the manufacturer.

Self-Priming Pumps

Chain Belt Co., 1600 West Bruce St., Milwaukee 4, Wis., announces production of a new line of Rex press-formed, self-priming centrifugal pumps. The press-formed feature refers to the pump body, which is pressed out of Armco ingot iron, and is therefore lighter in weight than cast-iron models, and is resistant to shattering or corrosion.

INDUSTRIAL NOTES

Charles W. Shugert, assistant advertising manager of Shell Oil Co., has been elected president of the Industrial Advertising Association of New York, Inc.

Frederick A. Mertz has been promoted to the position of chief engineer for **Traylor Engineering & Mfg. Co.,** Allentown, Pa., succeeding the late Richard Bernhard.

William C. Champion, Seattle, Wash., veteran employee of Lima Locomotive Works, Lima, Ohio, died April 4, 1947. He had been manager in the Pacific Northwest for Lima for 17 years.

Edgar F. Schaefer was recently elected president of Gardner-Denver Co., and **H. G. Myers,** former president, became chairman of the board.

Independent Pneumatic Tool Co., Chicago, Ill., announces the opening of a technical office in Sao Paulo, Brazil, under the direction of **Reuben P. Rudy.**

E. C. Low, vice president in charge of sales of the woven wire fabrics division of **John A. Roebling's Sons Co.,** announces the appointment of **J. F. Berger** as assistant sales manager.

Central Mine Equipment Co., St. Louis, Mo., announces the appointment of **Joy Manufacturing Co.,** as a distributor of its Coalmaster drilling tools.

J. W. White, who has been for 38 years in sales work with **Jeffrey Manufacturing Co.,** Columbus, Ohio, has retired. Mr. White is succeeded as manager of the Scranton office by **P. J. Horrigan.**

BULLETINS

Spectrographic Analysis: A non-technical description of the fundamentals and application of spectrographic analysis is contained in a new pamphlet prepared by Spectographic Services and Supplies, Inc., 21 Madison Ave., Saratoga Springs, N. Y.

Kilns, Coolers, Dryers. Bulletin A-442 of Vulcan Iron Works, Wilkes-Barre, Pa., contains more specific information on Vulcan kilns, coolers, and dryers than has ever before been available in printed form.

Acid-Proof Pumps. Olivite pumps for handling hot or cold acids or corrosive solutions in general are described in a new bulletin of Oliver United Filters Inc., New York 18, N. Y.

Flexible Couplings. An engineering catalog giving complete details on Thomas flexible shaft couplings is available from Thomas Flexible Coupling Co., Warren, Pa.

Surveys From Air. Topographic surveys made from airplanes are described in a new booklet issued by Aero Service Corporation, 236 E. Courtland St., Philadelphia 20, Pa. Using the Brock method, complete contour maps are said to be prepared in a short time and at low cost.

Chain Hoists. Whiting Corporation, Harvey, Ill., has published a new bulletin completely describing its new line of electric chain hoists.

Wagon Drills. Wagon-drill carriages and the drifter drills suited for use with them are described in a new booklet of Worthington Pump & Machinery Corporation, Holyoke, Mass.

Compressors. Air King compressor specifications and operating data are given in a bulletin of Worthington Pump & Machinery Corporation, Holyoke, Mass.

High-Pressure Pumps. A new 12-page bulletin of Byron Jackson Co., Box 2017 Terminal Annex, Los Angeles 54, Calif., describes the company's Hydropress pumps, a unit designed for high-pressure low-volume jobs. Volumes range up to 300 gpm.; pressures up to 5,000 psi.

Manganese Steel. A revised edition of a bulletin describing use of manganese steel for mining and quarrying has just been published by American Manganese Steel Division of American Brake Shoe Co., Chicago Heights, Ill.

Special Pumps. H. K. Porter Co., Pittsburgh 22, Pa., has prepared three new Quimby bulletins describing: screw pumps for lubricating or hydraulic systems; centrifugal sump pumps; and Rotex pumps for low-viscosity liquids at medium pressures.

New Buildings. Those engaged in new construction will find interesting a new booklet of Stonhard Co., Philadelphia 8, Pa., which describes surfacing materials designed for maximum service.

Pump Motors. Tri-Clad vertical induction motors for pump drives are described in a new bulletin of General Electric Co., Schenectady, N. Y.

Packing Rings. Vee-Flex automatic packing rings for various purposes are described in Bulletin A909 of Raybestos-Manhattan, Inc., Manheim, Pa.

Flotation Reagents. American Cyanamid Co., New York 20, N. Y., has released its "Mineral Dressing Notes, No. 15," which consists of an extensive review of types of flotation reagents, their best uses, points of application, amounts required, and other data. It will be sent on request to the company.

Air Hose. A new catalog section on its lines of air hose has been published by B. F. Goodrich Co., Akron, Ohio.

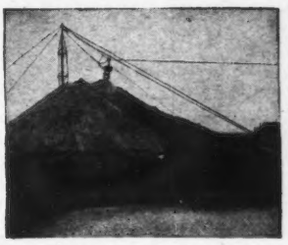
Crane Controls. Five types of magnetic crane controls for handling any type of load are described in a new 20-page booklet announced by Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

Magnetic Pulleys. Magnetic Engineering & Mfg. Co., Clifton, N. J., announces a new bulletin describing Memco high-power magnetic pulleys, both air-cooled and solid types.

Earthmoving Equipment. Proper choice as to use of wheeled or track-type, or both types of earth-moving equipment will be aided by Bulletin 9786, recently issued by Caterpillar Tractor Co., Peoria 8, Ill.

Transmission Belt. Specifications and construction features of Monarch brand transmission belting are outlined by Hewitt Rubber Division of Hewitt-Robbins, Inc., 240 Kensington Ave., Buffalo 5, N. Y.

SLASH COSTS
with Sauerman Machines



DEEP, WET EXCAVATION
Sauerman Slackline Cableway digs reservoir 400'x200' in area and places the spoil in a single high pile.

HEAVY EARTH HANDLING
This large Crescent scraper with carrier is working on a coal stripping job. It is making a cut 300 ft. wide, 60 ft. deep and moving over 6,000 cu. yds. of overburden a day.

THREE main economies are assured by using Sauerman Scraper or Cableway Machines for long haul work such as moving material from pits or ponds to processing plants, handling mine waste, stripping, stockpiling, backfilling stopes, etc. These savings are:

(1) Digging, hauling and automatic dumping are merged into a continuous, rapid operation controlled by one operator.

(2) Power requirement is moderate.

(3) Maintenance is simple.

Sauerman machines offer handling capacities from 10 to 1,000 tons per hour and operating spans from 200 to 1500 ft.. Specifications of the various sizes and types of machines, together with illustrations of their uses are given in the Sauerman catalogs. Write for this literature today.

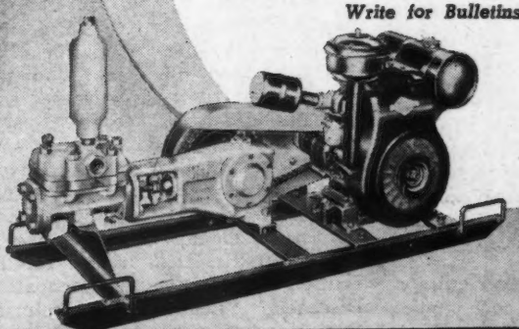
SAUERMAN BROS., INC.
584 S. Clinton St. Chicago 7, Ill.

AT LONG LAST

— A LIGHT WEIGHT PUMP
— BUILT BY DIAMOND DRILLERS
— SPECIFICALLY FOR DIAMOND DRILLERS

The new BOYLES BROS. "4-7" drill pump fills the long-felt need for light, easily transportable pumping equipment designed to meet average diamond drilling requirements. Double action delivers up to 400 G.P.M. at 400 lbs. pressure per square inch....700 G.P.M. at 225 lbs. Adjustment in seconds with spanner only. Slush pump type valves with replaceable rubbers and valve seats. Rugged air-cooled motor. Total weight 206 lbs.

Write for Bulletins



BOYLES BROS. DRILLING CO. LTD.
DIAMOND DRILLING CONTRACTORS AND MANUFACTURERS
VANCOUVER, B.C. • EDMONTON, ALTA. • PORT ARTHUR, ONT. • KIRKLAND LAKE, ONT. • YELLOWKNIFE, N.W.T.

NEW BOOKS

THE BIG BONANZA. By Dan de Quille. Alfred A. Knopf, New York, Edition of 1947. Pp. 436. Price $5.

This famous classic of the Comstock Lode, Nevada, first published in 1876, is presented in a new, attractive edition. No miner's library is complete without this authentic and interesting account of the discovery, development, and working of the Comstock and of the life of the region at the time. The illustrations of the first edition are reproduced.

RAW MATERIALS FROM THE SEA. By E. F. Armstrong and L. M. Miall. Chemical Publishing Co., 26 Court St., Brooklyn, N. Y. Pp. 196. Price $3.75.

The authors' preface indicates that this little book has been written in response to a recommendation by the "British Association Conference on Science and World Order" that a scientific review be prepared of the world's mineral resources "in connection with the fourth clause of the Atlantic Charter." Whatever be the status of this seemingly official sponsorship (the publishers shed no light), the book deals in a very readable way with a topic that fascinates if only because of the innate suggestion that the ocean is a treasure house open to all. After discussing the extent and volume of the oceans, the chemical content and the biochemistry of the seas, the authors treat in respective chapters the subjects of solar salt (or recovering salt from sea water by solar evaporation), bromine, magnesium, iodine (including the seaweed industry), and potassium salts. Interestingly, they conclude with a chapter on the production of potable water from sea water. Notes on analytical methods used in determining the various elements in the minute quantities in which they occur in sea water are given in an appendix.

A.H.H.

INDUSTRIALIZATION OF LATIN AMERICA. Edited by Lloyd J. Hughlett. Published by McGraw-Hill Book Co., Inc., 330 West 42d St., New York 18, N. Y. Pp., 493. Price, $5.

Lately there has developed quite a body of opinion, pro and con, on the size of the export market in Latin America for products of the United States, and on the progress of, or need for, industrialization in Latin America. Nearly everyone who travels south of the United States comes back with some opinion on these matters, which he is only too anxious to expound to anyone who will listen. This reviewer is himself an example of this fact.

However, there has existed nowhere a single authoritative source of detailed information on the size and scope of Latin American industries on which estimates, or preliminary market studies, could be based. In making up their minds on what part to play in the development of Latin American industries, investors here need information on sources of raw materials, government attitudes, labor supplies, means of transportation, present state of industry, and a host of other matters. Certainly the information required for any particular undertaking would fill a book on its own.

Lloyd Hughlett, who has considerable background of experience in Latin America, has collected in one volume as much as possible of material covering details of the present status of 17 fields of industry south of the Rio Grande. To do so, he has sought the opinions of experts in each field, men who are, for the most part, actively engaged in the businesses about which they write. The result is informative, to say the least, and it can be helpful to people concerned with Latin America, as well as interesting to those who want only to keep informed. R.H.R.

HEALTH IN INDUSTRY. Bulletin No. 8 of the Industrial Hygiene Foundation, 400 Fifth Ave., Pittsburgh 13, Pa. Pp. 116, Price $3.

This volume comprises the transactions of the eleventh annual meeting of the Foundation, in November 1946, and includes papers on "Health in Industry," "Production Comes From People," "Trends in Industrial Health Administrative Practices," "Findings From Foundation Plant and Laboratory Research," "Management's Opportunity to Advance Occupational Health," "Acute Respiratory Infections and Their Control in Industry" (with special reference to influenza immunization), "Treatment of Chemical Burns of the Eye," "Legal Developments Respecting Occupational Health," "Codes for Prevention and Control of Occupational Diseases," "Legal and Administrative Handicaps to a Rehabilitation Program," "The Human Factor in the Design of Industrial Machines," and "Sick Absenteeism Among a Sample of Member Companies of Industrial Hygiene Foundation."

COMMUNISTS WITHIN THE LABOR MOVEMENT. Prepared and published by the Chamber of Commerce of the United States, Washington, 6, D. C. Pp., 54. Single copies, $0.50; rates on larger quantities on application.

Here is an account of the manner in which, and the extent to which, Communists have infiltrated into the American labor movement. There is further some advice to employers on how to cope with Communist-dominated labor unions, and on what to do about helping unions rid themselves of this domination. The pamphlet is well worth reading, but it is typical of the nature of the problem that the authors are well supplied with evidence as to the presence and the active work of the Communists but they run a little short on what to do about the Reds. However, if it does no more than get people to thinking about this serious problem, the pamphlet will have been well worth while.

HOW TO TUNE UP YOUR AUTOMOBILE. By Jack Steele. Norman W. Henley Publishing Co., 17 West 45th. St., New York 19, N. Y. Pp., 232. Price, $2.50.

Personally I found this book interesting, and if I ever again attain the status of a car owner, I expect to find it useful as well. I like to do my own adjusting on things like cars, and I like to have some idea of what to do when things go wrong. This book seems a good guide on both points. R.H.R.

THE STORY OF WATER SUPPLY. By F. W. Robins. Published by the Oxford University Press, 114 Fifth Ave., New York 11, N. Y. Pp., 202. Price, $5.50.

Water is a substance that we take for granted until we run out of it, when we become instantly and painfully aware of how necessary an item it is. Certainly much of the history of man and of the various geographical and economic entities which he has developed is bound up with the vital question of water supply.

Mr. Robins' book is a record of man's efforts to supply this need for water. It is not a technical book, nor does it dwell long on modern accomplishments, except as they provide the latest link in the historical chain. Starting from the very beginnings of man's attempts to conserve natural

supplies, Mr. Robins works up through the water systems of the Phoenicians, the Greeks, the Romans, of medieval towns, of English villages, and so on up to the present day. He discusses things like developments of pumps, "water-witching," conduits, parish pumps, and other fascinating side issues. All this is done with great detail and excellent documentation. It is a scholarly historical work; it is not in any sense a lively or "popularized" sort of book.

One statement near the end catches the eye. "Britain is possibly the best 'watered' country in the world." Possibly. We do not have the figures to challenge this statement, but based on our own limited travel experience, and on the stories told us by our much more widely traveled friends, we would like to say simply that there is no better "watered" country in the world than the United States. Or heated, or lighted, or fed. Modesty forbids us to go further R.H.R.

GEOPHYSICAL ABSTRACTS, 126. Published by U.S.B.M. as Information Circular No. 7400. Available from Superintendent of Documents, Government Printing Office, Washington, 25, D. C.

Geophysical abstracts have been prepared and published for some time by the U. S. Bureau of Mines, but beginning with January 1947 they will be published by the U. S. Geological Survey. The aim is to collect summaries of all articles in current literature of interest to those engaged in geophysical research or exploration. The current issue covers the period July-September 1946.

PUBLICATIONS RECEIVED

The U. S. Bureau of Mines, Washington, D. C., has issued the following Information Circulars and Reports of Investigations (no charge is made. Address the Director):

I.C. 7393. "Diamond-Drilling Blast Holes, Eastern Magnetite Mine A." Pp. 8.

R.I. 3949. "Exploration of Gold, Silver, Lead, and Zinc Properties, Eureka Corporation, Eureka County, Nev." Pp. 18.

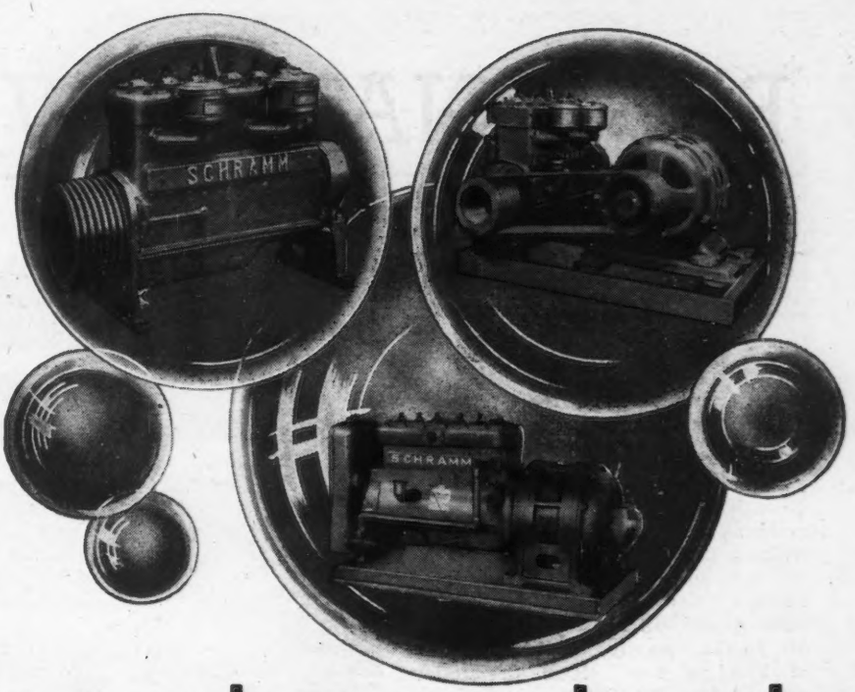
R.I. 3978. "Exploration of Cape Mountain Lode-Tin Deposits, Seward Peninsula, Alaska." Pp. 16.

R.I. 3979. "Exploration of Southern Cross Iron Deposits, Deer Lodge County, Mont." Pp. 14.

R.I. 3980. "Pilot-Plant Production of High-Grade Magnetite Concentrates, Cranberry, N. C." Pp. 7.

R.I. "Exploration of Choteau Titaniferous Magnetite Deposit, Teton County, Mont." Pp. 12.

R.I. 3982. "Exploration of New Planet Iron Deposit, Yuma County, Ariz." Pp. 37.



packaged air

is more than a pipe dream. SCHRAMM COMPRESSORS, for example, package air every day for industrial consumption. The selection of SCHRAMM AIR COMPRESSORS is influenced by features that include: (1) 100% water cooled; (2) forced feed lubrication; (3) mechanical intake valve; (4) compact, lightweight. Designed for heavy duty, continuous service and minimum attention. There's a SCHRAMM AIR COMPRESSOR for your every need, in sizes ranging from 2 to 600 cubic feet displacement.

SCHRAMM
INC.
THE COMPRESSOR PEOPLE
WEST CHESTER, PENNSYLVANIA

REGIONAL NEWS

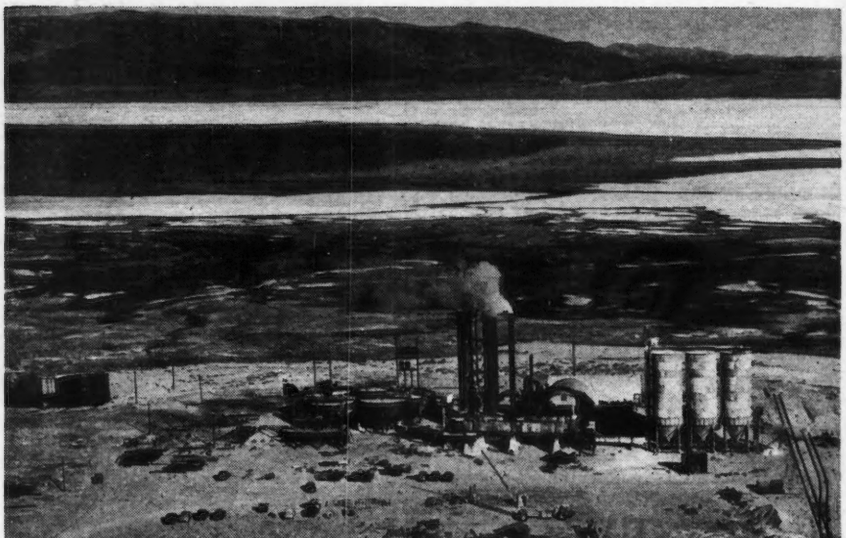
CALIFORNIA

New company operates Randsburg placer property — Afterthought mines to be reopened

★ The Idaho-Maryland Mines Corporation during 1946 operated its Brunswick and Idaho Maryland properties at Grass Valley, Nevada County, without interruption, producing 185,943 tons of ore, the year-end report reveals. Gross value of bullion totaled $1,459,943 before mint charges of $5,994, leaving a net revenue of $7.81 a ton. Metal production amounted to 142,138 oz. gold and 11,602 oz. silver. Of the gold production 784 oz. resulted from clean-up operations conducted by a contractor. Unfavorable factors affecting net earnings were listed in the report as: increased labor costs; increased material and supplies costs; diversion of $109,010 to repair damage caused by enforced wartime shutdown; and drop in ore grade. Goals set by the company for 1947 include efforts to improve ore grade at the Brunswick mine and expansion of production at the Idaho property. E. L. Oliver is president of the corporation; Neil A. O'Donnell is executive vice-president and general manager in charge of operations.

★ Permanente Metals Corporation has completed a new soda-ash plant at Owens Lake, Inyo County. The plant, built in the record-breaking time of 67 ten-hour shifts, will produce 100 tons of soda ash a day, all of which will be shipped to Permanente's Baton Rouge alumina plant. The new plant produces soda ash by the "natural" process as contrasted to the Solvay process, the required brine being pumped to the plant from a nearby lake. About 50 men are employed under the direction of Walt Adams, superintendent.

★ Operations are being resumed with a large Bucyrus-Monighan dragline and a floating gravel-washing plant at the placer property northeast of Randsburg, Kern County, formerly worked by Rand Gold Dredging Association, of San Francisco, of which the late Newton Cleveland was a prominent member. The new firm is known as Kern Placers, Inc. A. B. Woodward, Jr., is superintendent in charge of the work. Water for the washing-plant pond will be obtained from three wells drilled by the old company in 1942. The property was worked for recovery of both gold and tungsten, but operations stopped when the bucketline dredge of Rand Gold Dredging capsized in 1943.



GENERAL VIEW of the new soda-ash plant built by Permanente Metals Corporation at Owens Lake, Inyo County, Calif. The plant has a daily capacity of 100 tons of soda ash and will supply Permanente's Baton Rouge alumina plant. Brine is pumped to the plant from the lake in the background.

★ Hydraulic mining operations are in progress at the Judge mine, at Sawyer's Bar, Siskiyou County, under the direction of E. A. von Goerlitz. Current work is concentrated on a high bench where Eddy's Gulch gravel channel cuts across the mountain to terminate at the North Fork of the Salmon River.

★ Mt. Gaines Mining Co. has been awarded a 10-year extension of its operating lease on the Mount Gaines mine, at Hornitos, Mariposa County, by the Ninth Federal Court of Appeals, in San Francisco, which upheld a Nevada Federal District Court decision by Judge Norcross against the Title Insurance & Guarantee Co. The Mount Gaines mine was the largest gold producer on the Mother Lode in 1946, with near-capacity production maintained during the year. J. P. Hart, of Reno, Nev., is trustee and manager. John L. Dynan is superintendent of operations.

★ The Swiss quartz mine, near Seneca, Plumas County, is to be reopened and equipment installed, according to Wilson Woodward, who purchased the property from W. B. Perry and E. Pazzoni in 1945. A crew of 12 men is to be employed.

★ Western Mines Co. is doing development work with a small crew of men at the Brown Bear gold mine, in Trinity County, leased from E. E. Erich, San Francisco consulting engineer. R. Rice is superintendent.

★ Liddicoat Gold Mines Co., of Auburn, is opening up the Grit mine, six miles north of Greenwood. High-grade gold ore has been encountered in the vein 325 ft. below the old upper workings, and about 10,625 tons of rich ore is now ready for stoping and milling. The mine can be worked for a depth of 800 ft. below the present level by tunnel mining, thus eliminating the cost of shaft sinking and pumping, as well as hoisting.

The Grit mine is at the northern end of the Mother Lode, in Eldorado County, and is noted for its production of specimen gold. One specimen extracted from the old upper workings in 1865 weighed 101.4 oz. troy and is now on display at the Museum of the State Division of Mines.

It is planned to install a 50-ton milling plant this spring equipped with a ball mill, jig, classifier, flotation cells, and concentrating table. Otto C. Radley, of Auburn, is engineer and manager of operations for the company.

★ The Afterthought mines, at Ingot, 24 miles northeast of Redding, will be reopened by Coronado Copper & Zinc Co., according to an announcement by Lytelton Price, superintend-

California *(continued)*

ent of the Coronado company. Plans call for employment of 100 to 150 men and construction of a 1,500-ton mill by the end of the year. Investigation of the properties, last worked 19 years ago, is said to have revealed sizable orebodies averaging 18% zinc, 2.5% copper, 8 to 9 oz. silver, and $2 in gold per ton. The present workings are 800 ft. deep and are opened by eight levels.

★Gold Ventures, Ltd., has been incorporated for the purpose of carrying on dredging operations on gold-platinum-bearing placer properties acquired in Siskiyou County. Paul A. Bundy, mining engineer formerly associated with Bradley Mining Co. and New Goldfields of Venezuela, is president and general manager of the new company; Peter J. Huth, of Sacramento, is vice president; and David Holtman, of Grass Valley, is secretary. John H. Frasher will superintend dredging operations. The company offce is temporarily at Grass Valley.

Exploration of the deposits has been in progress for more than a year, a company official stated, and sufficient gravel has been developed to assure an operating life of seven years. Necessary dredging equipment has been contracted for purchase, and it is planned to begin dredging early this summer. The contemplated rate of mining is around 1,000,000 cu. yd. per year. A program of progressive exploration will be maintained to extend reserves.

ARIZONA

Inspiration prepares for open-pit mining—New zinc mining enterprise at Tombstone

★Arizona increased its output of gold, copper, lead, and zinc in 1946. Despite labor strikes at key mines and smelters that halted production for more than three months, copper production was approximately 1% greater in 1946 than in 1945. Totals were as follows: 78,300 oz. gold; 3,400,000 oz. silver; 582,000,000 lb. copper; 47,500,000 lb. lead; and 85,000,000 lb. zinc. Total value of these metals was $114,527,200.

The Morenci mine remained by far the largest producer of copper, followed by New Cornelia, Inspiration, Castle Dome, Miami, Kennecott, United Verde, Magma, Bagdad, and Copper Queen, in that order. The State exceeded its 1945 record output of lead by 1,766,000 lb., the gain being principally due to increased output of zinc-lead ore from the Copper Queen mines at Bisbee.

★Inspiration Consolidated Copper Co. will soon place a major open-pit mine in operation at Miami, accord-

"VIC" VICTAULIC SAYS...
"IF YOU'D LIKE INCREASED DELIVERY AT LOWER PUMPING COSTS!..
"Look into this winning combination—Victaulic Full-Flow Fittings and Victaulic Couplings! You'll find out about a pipeline that not only increases delivery...it also lowers pumping costs!
"Our Full-Flow FITTINGS are designed with long and easy sweeps...have true-circular, smooth walls that eliminate internal projections and pockets.
"But that's not all! Victaulic COUPLINGS give pipelines flexibility...and a union at every joint. This positive, slip-proof coupling can't blow off or pull out under pressure, vibration, or sag! Also, the 'two-bolt' simplicity of Victaulic Couplings saves time with quicker installations, saves money with easy sectional repairs and 100% salvageability!"
Why not save yourself both time and money by making your next pipeline completely Victaulic...Victaulic Full-Flow Elbows, Tees and other Fittings joined with Victaulic Couplings!
Write for new Victaulic Catalog and Engineering Manual
VICTAULIC COMPANY OF AMERICA
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
Victaulic, Inc., 727 W. 7th St., Los Angeles 14, Calif.
Victaulic Company of Canada, Ltd., 200 Bay St., Toronto 1
For export outside U. S. and Canada: PIPECO Couplings and Fittings: Pipe Couplings, Inc., 30 Rockefeller Plaza, New York 20, N. Y.
Have you considered Victaulic for your piping requirements?
Sizes—¾" through 60"
Copyright 1947, by Victaulic Co. of America
SELF-ALIGNING PIPE COUPLINGS
VICTAULIC
EFFICIENT FULL-FLOW FITTINGS

Your Dredge DOLLARS Earn More

Just because a JIG costs so little as compared with a dredge—both in purchase price and operating cost—don't under-estimate its importance. The right jig increases the recovery your dredge delivers—makes your dredge investment pay a bigger return.

PAN-AMERICAN JIGS

were perfected on dredges—for dredges—have been standard equipment on leading makes of dredges for many years. All the various types of Pan-American Jigs meet the 8 essentials a dredge jig MUST have:

1. High recovery at low cost.
2. Lower power cost per yard.
3. Minimum maintenance and shutdown.
4. Simplicity of operation.
5. Low working load weight.
6. Efficient use of floor space.
7. Competitive first cost.
8. Proved mechanical design and construction which has delivered years of heavy duty on dredges everywhere.

Let us help you choose the right type of Pan-American Jig, built especially to help your particular type of dredge earn maximum profit. We will be glad to send you detailed specifications.

PAN-AMERICAN ENGINEERING CO.

820 Parker Street

Berkeley 2, California, U. S. A.

CABLE ADDRESS: "PANCO"

• Design, Metallurgical Testing and Field Consulting Service; Manufacturers of Mill and Placer Recovery Equipment

Arizona *(continued)*

ing to an announcement by P. D. Honeyman, general manager. The new mine will augment underground mining in the Globe-Miami district. New equipment needed in the operation is now being installed, Honeyman said.

The new mine is the result of studies begun about a year ago to determine future mining plans. The study revealed that the open-pit method in certain areas of the company's holdings would be feasible and more economical. Operation of the new mine will not increase total production, as there will be a corresponding reduction in underground work.

Ore will be hauled from the pit to a crushing plant at nearby Inspiration, and from there will be taken by conveyor belt to a railroad spur. Two electrically operated shovels and a smaller diesel-type machine will be employed in the operation, which Honeyman says will start early in 1948.

★ Officials of Tennessee Schuykill Corporation, at Chloride, announced at the annual meeting that the crosscut from the main shaft on the 1,000-ft. level of the Tennessee mine had encountered a vein which at that point is approximately 30 ft. wide. Although the crosscut has not yet reached the hanging wall, it was stated that a width of 5½ ft. of lead-zinc ore had been exposed assaying 12% lead and 14% zinc. Approximately 100,000 tons of a good grade of ore in a length of 450 ft. was mined from the upper extension of this vein during the war, the management stated.

Stockholders were told that ore is being mined from the vein 200 ft. below the present intersection, as the result of a recent discovery at that point. It is estimated that 150,000 tons of additional ore reserves are now contained in the area of the Tennessee mine.

Directors elected for the ensuing year were: Nye A. Wimer, Robert H. Lesher, and Dorothy A. Decker.

★ At a special meeting of the stockholders of Shattuck Denn Mining Corporation at Bisbee, Ariz., the sale of the Denn mine, near Lowell, to Phelps Dodge Corporation was approved. Phelps Dodge will pay Shattuck Denn $300,000 plus royalties on all ore in excess of the first 100,000 tons extracted from the Denn mine.

★ Operations, Inc., recently organized under a New Jersey charter and financed by Texas and California capital, has started work on a new zinc mining and milling enterprise at Tombstone. A 100-ton flotation mill is being constructed alongside the Southern Pacific tracks in Tombstone. The mill will be powered by natural-gas engines. A 2,000-ft. high-pressure gas line is being completed from the gas pumping substation. The company has also contracted for an access road 2.8 miles long to the zinc property in the Dragoon Mountains, 12 miles northeast of Tombstone.

Principals in the new company are Francis Frederick, of Berkeley, Calif., president; George I. Barnett, also of Berkeley, vice president and general manager; Glenn Acton, of Dallas, Tex., secretary-treasurer; and Gerald and Guy Mann.

★ Heavy equipment, including bulldozers, scrapers, trucks, and other mining machinery has been shipped from Los Angeles by Pomona Mining Co., headed by Everett Jones, to a copper-silver showing in the Gardner Canyon area of the Santa Rita Mountains, east of Nogales. The deposit was discovered four years ago. Extensive sampling is reported to have shown 3% copper and 17 oz. silver per ton.

The Pomona company has also acquired the recent gold discovery in the foothills of Baboquivari Peak, southwest of Tucson. This find, exposed by a 10-ft. shaft bottomed in high-grade ore carrying free gold and native silver, is to be explored.

★ The new lead-zinc flotation plant at the Hillside mine is scheduled for early completion. The property was taken over by Ernest R. Dickie and associates in 1945.

★ The Bagdad Copper Corporation is installing an additional unit to handle oxide as well as sulphide values from its copper porphyry. The new acid flotation cells, constructed by George Green and E. A. Girard, have been installed and the new recovery unit was expected to be in operation in March.

NEVADA

Eagle-Picher Co. will process diatomite — Project 300-ton mill at Jumbo gold mine

★ Eagle-Picher Co., of Cincinnati, through its Insulation Division, is completing construction at Clark, 18 miles east of Reno on the Southern Pacific main line, of a plant designed to process diatomite from a deposit seven miles distant, already stripped for production by power shovel. Plant capacity will be in excess of 700 cu. yd. of raw material daily, or from seven tons per hour upward of finished products of a wide variety. Ground material will range in fineness from 10 mesh to air-float minus-325 mesh for the flexible flowsheet. Products are to include insulation materials, filtering media, absorbents, catalysts, fertilizer, disinfectants, insecticides, paint filler, cement and aggregates, dry cleaner, solvents, and protein extracts. Thomas A. Copeland is managing engineer.

★ The four-compartment Fad shaft of the Eureka Corporation, Ltd., subsidiary of Ventures, Ltd., of Toronto, lately reached a depth of 1,730 ft., where sinking has halted while a station is cut at the 1,700, or 4th, level. Water inflow has increased to 850 gpm. A 1,000-kw. generator, described as a Worthington SEH-8 diesel unit, has been delivered at the Ruby Hill property, one of three that will provide 1,900 kw.

★ Reports at Virginia City indicate that the Sutro tunnel of the Comstock Tunnel & Drainage Co. is to be reopened by that company's operating subsidiary, Sutro Tunnel Coalition, Inc. Completed in 1878 by Adolph Sutro, the tunnel, with north and south laterals, was driven 20,500 ft. from its portal near the Carson River, entering the Comstock lode at a vertical depth of 1,640 ft.

★ Through Governor Vail Pittman and other agencies, the State of Nevada is negotiating for acquisition from War Assets Administration of the Basic Magnesium, Inc., plant, power, and water facilities at Henderson, Clark County. Two chemical companies and the U. S. Vanadium Corporation now occupy units of the plant, which has many buildings available for industrial uses.

★ Substantial widths of silver-lead-gold ore are indicated in recent diamond drilling on the property of Nevada Equity Mining Co., adjoining formerly productive mines at Lander Hill, near Austin, according to Robert H. Raring, vice president and directing engineer, who holds similar offices with the Copper Canyon Mining Co. The 350-ft. Hillside incline shaft of the property has been reconditioned to the water level and later will be connected with the 1,700-ft. Equity tunnel.

★ Excavation for a 300-ton mill was reported in progress at the Jumbo gold mine at Awakening, Humboldt County. The mill would replace a 50-ton amalgamating plant in the valley to which ore formerly was trucked. George Austin of Reno, owner, some eight years ago gave an option on the property to Texas oil men for a purchase price of $10,000,000, received a $250,000 down payment, and following forfeiture of the option continued operation of the small mill at a profit.

★ The Contention mine, an early-day producer of high-grade copper ore in the Copper Basin district, Lander County, now owned by Copper Canyon Mining Co., has been acquired on long-term lease by Stanley F. O'Leary, mining engineer and mine operator of Battle Mountain. Complete equipment has been provided in preparation for early smelter shipments.

★ Juanita Mining Co., with property in northwestern Humboldt County, reports the completion of some 690 ft. of tunnel and has started sinking

Simplex-ANHYDREX
UNDERGROUND
CABLES

FOR USE WITH
OR WITHOUT DUCTS

- COPPER CONDUCTOR
- ANHYDREX INSULATION
- TAPES AND FILLING
- HARD SERVICE JACKET

Easy to....

- SPLICE
- INSTALL
- TERMINATE
- MAINTAIN

Simplex-WIRES & CABLES

SIMPLEX WIRE & CABLE CO. 79 SIDNEY ST. CAMBRIDGE 39, MASS.

NEW COATED
STOODY SELF-HARDENING
for hard-facing all heavy equipment

1. FASTER APPLICATION
2. NO SLAG INTERFERENCE
3. AC-DC APPLICATION
4. SELF-LIFTING SLAG
5. WIDE AMPERAGE LATITUDE
6. COMPLETE UNIFORMITY
7. FREEDOM FROM MOISTURE ABSORPTION
8. CAN BE WELDED IN ALL POSITIONS
9. EQUAL HARDNESS ON MULTIPLE DEPOSITS

New EXTRUSION COATED
STOODY SELF-HARDENING

retains its original hardness and wear resistance, yet possesses even better *weldability!*

Try 50 lbs. today—no increase in price! Available in ¼", 3/16", 5/32" and ⅛" rod diameters. Over 600 U. S. dealers.

FREE: STOODY GUIDE BOOK. 125 practical ways to increase equipment life with hard-facing.

STOODY COMPANY
1140 W. SLAUSON AVE., WHITTIER, CALIF.

STOODY HARD-FACING ALLOYS
Retard Wear Save Repair

Nevada *(continued)*

a 200-ft. internal shaft. Work is done under contract, with Frank Dean, of Winnemucca, in charge.

★ A project involving the reopening of a long tunnel and laterals on the Diamond-Excelsior mines, on Prospect Mountain, near Eureka, together with extended prospect drilling, has been undertaken by Consolidated Eureka Mining Co., organized by J. E. Hogle & Sons, brokers, of Salt Lake City. The mines were formerly lead-silver producers.

★ Fire in mid-March destroyed the power plant and shops at the Mt. Hope lead-zinc-cadmium mine of the Callahan Zinc-Lead Co., in central Eureka County, cutting off all power for the mine, 200-ton selective-flotation mill, and water-supply system. Three workmen were overcome by smoke, but no damage resulted to the mine or mill. Karl K. Hood, manager, indicated that new power equipment would be provided.

OREGON

Alcoa tests laterite deposits on substantial scale

★ Gold production in 1946 of 18,529 oz., compared to 4,467 oz. in 1945, showed a big increase but is still low in comparison with the State's 1940 record output of 113,402 oz. Other figures were: silver, 5,890 oz., compared to 10,461 oz. in 1945; copper, 8,000 lb., compared to 2,000 lb. in 1945; lead, 6,000 lb. compared to 2,000 lb. in 1945. The production of zinc was listed as 2,000 lb. for 1945, with none reported for 1946. Value of the above-listed metals for 1946 is given by the U. S. Bureau of Mines as $655,168, compared to $164,456 in the previous year.

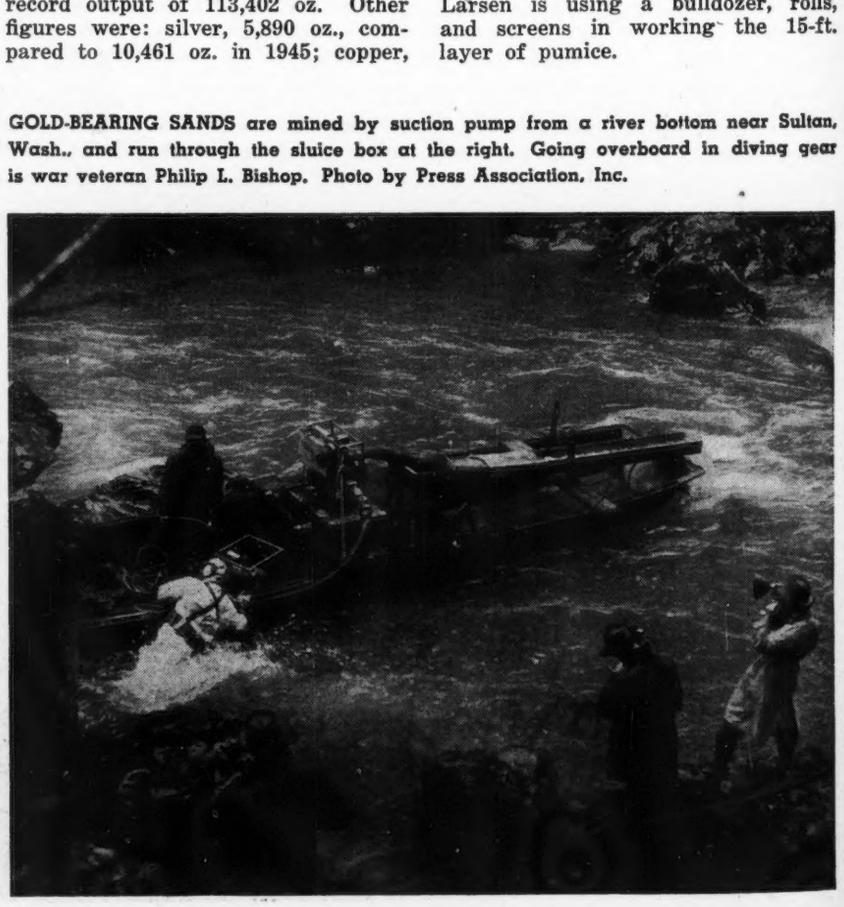
★ Alcoa Mining Co. officials told newsmen on March 15 that the company has spent $1,000,000 testing samples of laterite from deposits fouud in northwestern Oregon and Cowlitz County, Wash., and is hoping to develop its own ore field in the Pacific northwest. Laterite is a low-grade bauxite which is high in iron oxide, but commercial use of this deposit will depend on development of an economical process for extracting the alumina.

★ The Oregon Chrome mine, in Josephine County, closed for about a year, is employing six men. A 500-ft. tunnel is being driven.

★ The Oregon King mine is to be reopened under the supervision of Carl V. Ohman. The property, in Jefferson County, is a silver producer. William J. Murphy will be mill superintendent.

★ Volcanic Materials Co. is shipping about 15 cars per month of pumice from a pit leased from the town of Tumalo, in Deschutes County. The pumice is supplied to building-block manufacturers in Portland, Walla Walla, and other points. Walter A. Larsen is using a bulldozer, rolls, and screens in working the 15-ft. layer of pumice.

GOLD-BEARING SANDS are mined by suction pump from a river bottom near Sultan, Wash., and run through the sluice box at the right. Going overboard in diving gear is war veteran Philip L. Bishop. Photo by Press Association, Inc.



WASHINGTON

New interests acquire Germania tungsten mine — Bids on Mead magnesium plant rejected

★ Tungsten Mining and Milling Co. has purchased the old Germania tungsten mine, which includes some 700 acres of deeded land and mining claims in southwest Stevens County, from R. H. Mills & Associates, according to Albert L. Ray, chairman. About eight men will be employed on development work and exploration of two newly discovered veins this spring, and plans are being made to construct a 100-ton mill at the property before production is started from the veins. H. C. Cooper, superintendent, states it is estimated that $200,000 worth of ore on the surface will enable the mill to operate for the first six months. One of the former owners of the mine was General Electric Co.

★ The 1,000-ft. crosscut tunnel at the Big Lake mine, near Kettle Falls, after passing through 120 ft. of altered granite has cut a 50-ft. quartz vein at a depth of 600 ft., according to Will Everett, of Spokane. The company is drifting on a 17-ft. zone showing gold-silver-lead and zinc ore of milling grade.

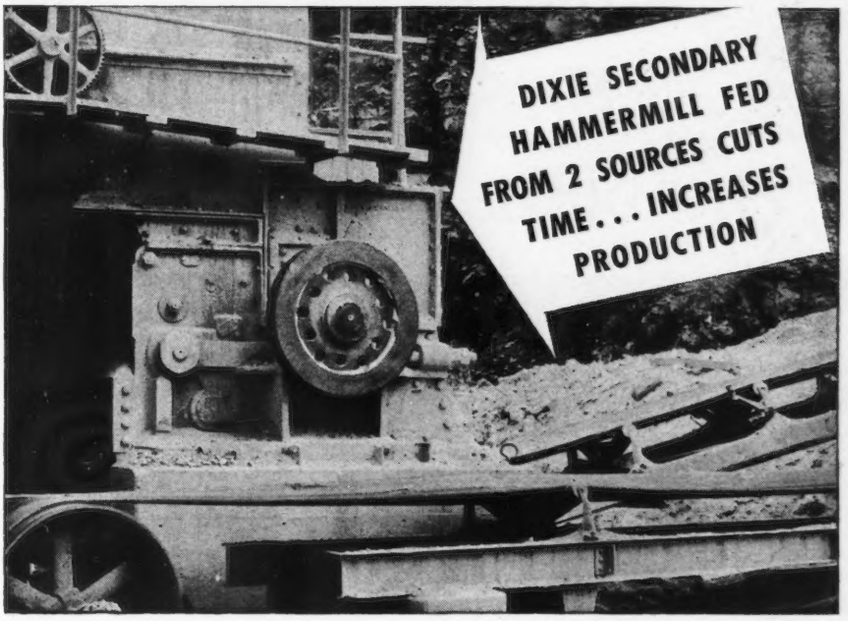
★ War Assets Administration has rejected the two bids received for the Mead magnesium plant, at Spokane, according to reports. Bids were opened on Jan. 6 on the $15,000,000 plant, and the two offers were $6,561,400 by Morley & Associates, of Seattle, and $8,000,000 by the American Chrome & Magnesium Co., of New York. WAA approved temporary use of the plant by the latter company for experiments on new processes for reducing ores and requested American Chrome & Magnesium to submit a proposal for operation of a pilot plant to prove out its laboratory processes.

★ Officials of Permanente Metals Corporation announced in Spokane on March 20 that the Tacoma aluminum reduction plant would not open the last of March as scheduled, due to a shortage of soda ash. The Baton Rouge plant, which needs the soda ash to supply alumina for the Mead and Tacoma reduction plants, has not been able to attain sufficient production for full operation at Mead. Officials hope that production in Tacoma may be started early in May.

★ First Thought mine, at Orient, is raising a working shaft from No. 7 level to No. 5 level for the purpose of cleaning out muck so that the high-grade ore on the No. 7 level can be developed, according to a report from Harry Townsend, of Seattle, consulting mining geologist. Drifting will continue both ways on No. 6 level along the hanging-wall

Modernized Quarry Operations at Linwood Stone Products Co.

SAVE MONEY IN THESE 2 IMPORTANT WAYS



From Primary Crusher or direct from Quarry is the Double-Duty assignment of this Dixie 50 x 50 inch Hammermill

The Dixie Hammermill in operation at Linwood Stone Products Co., Linwood, Iowa, is often called upon to play an important dual role. In the production of agstone the Dixie is equipped with 1 in. bars. The yield is 200 t. p. h. of minus 1 in. stone of which 80% passes agstone specifications. When an increase is desired in larger sizes the mill is equipped with 2½ in. bars yielding up to 300 t. p. h. of minus 2 in. stone. With the larger cage bars in the mill, *production* can be *stepped up . . . much time saved . . .* by feeding the Dixie Secondary Crusher from 2 sources . . . the primary crusher and . . . direct from the quarry. This is but one of many examples of the ability of a Dixie Hammermill to cut costs and increase output.

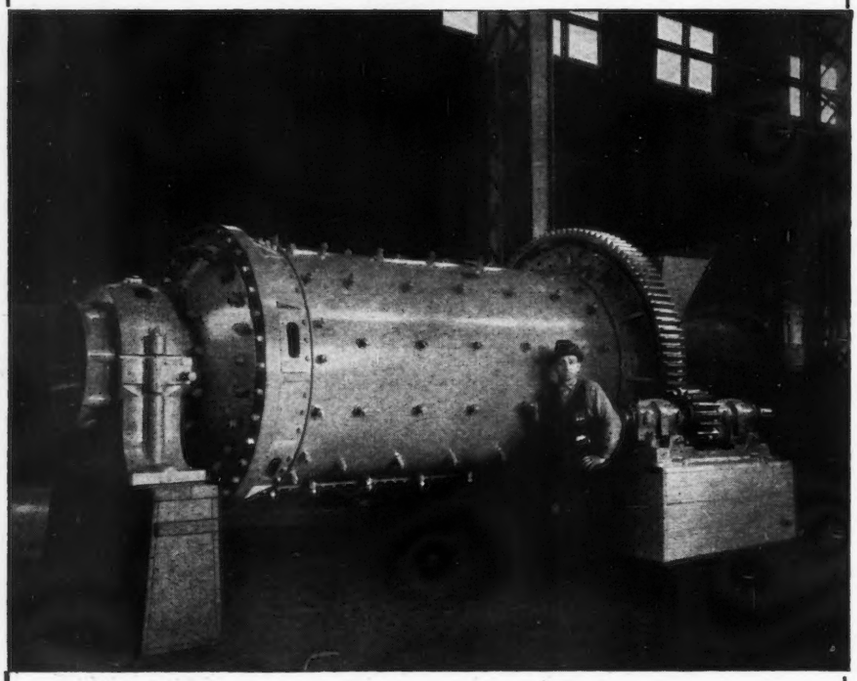
Whatever your crushing problem it will pay you to investigate the time and money-saving features of the Dixie Hammermill. Send for your free copy of "More Efficient Crushing of Raw Materials."

DIXIE
MACHINERY MANUFACTURING CO.

4204 Goodfellow Ave.
St. Louis 20, Mo.

Foreign Sales Office:
104 Pearl St., New York, N. Y.

For "Straight-Through" Grinding... HARDINGE ROD MILLS



The Hardinge Conical-Ended Rod Mill is ideal for producing minimum oversize when grinding in open circuit. Grinds either wet or dry. Conical heads reduce friction—prevent congestion of material at the ends. Rods are self-aligning. Bulletin 25-B.

HARDINGE
COMPANY INCORPORATED
YORK, PENNSYLVANIA — 240 Arch St. • Main Office and Works
NEW YORK 17—122 E. 42nd St. • 205 W. Wacker Drive—CHICAGO 6
SAN FRANCISCO 5—94 Natoma St. • 200 Bay St.—TORONTO 1

Washington *(continued)*

contact. Charles Isenor, mine superintendent is supervising the work.

★ Metaline Mining & Leasing Co., with zinc-lead holdings near Metaline Falls, reported a 1946 net profit of $15,181.24, compared to a loss of $37,674.40 in 1945. In 1946, 36,925 tons of ore were mined and milled to produce concentrates of 2,541 tons.

IDAHO

Howe Sound investigates cobalt deposits—Hecla developing Rock Creek claims

★ Cobalt-copper deposits in the Blackbird district of Lemhi County, in the Salmon River area, are being developed by Howe Sound Mining Co., which has an option on 41 mining claims and is driving a development tunnel 2,800 ft. long to explore what is known as the Uncle Sam group of claims. The U. S. Bureau of Mines started drilling in the district in 1942 and reports that the drilling operation "resulted in the discovery of a large body of cobalt-copper ore along the east side of Meadow Creek. The orebody is now under development by the Howe Sound company." The Bureau of Mines says of the district in general that "cobalt occurs as fine- to coarse-grained lenses, stringers, and disseminations of cobaltite along zones of fracturing and shearing in both quartzites and schist. Copper and gold are present in minor quantities."

★ The annual report of Hecla Mining Co. for 1946 announces that the company received dividends of $500,000 from Sullivan Mining Co., in which Helca owns a half interest, and $252,900 from the Polaris Mining Co., controlled by Hecla. Hecla stockholders received dividends totaling $1,000,000.

Reporting on tailings re-treatment operations, President L. E. Hanley says:

"The Osburn tailings plant was operated at full capacity up to November, when the tonnage was cut approximately 50%. This operation at the present rate will probably last until sometime in the coming fall. Up to the end of 1946 we had processed 2,743,950 tons of these tailings.

"Owing to labor shortages production from the Star mine and the electrolytic zinc plant was substantially curtailed," continued the report. "During the winter months the labor supply improved and the zinc plant has been on full production for the past three months.

"The Sullivan Mining Co. (in which Hecla owns a half interest with Bunker Hill) has taken leases and options on a considerable acreage of ground in the Metaline mining dis-

trict (in Washington), and will carry on a development program this spring."

★ Hecla Mining Co. has incorporated Rock Creek Mining Co., with a capitalization of 3,000,000 shares, which is all owned by Hecla with the exception of 150,000 shares of non-assessable stock issued in payment for mining property. The deal for the Rock Creek group includes 14 claims owned by Gem State Mining Co., on which Hecla holds an option, and provides for 200 ft. of shaft work on the Gem State group, now under way. Two bulldozing machines are employed in surface prospect work on the main Rock Creek group. Results of this work will determine the plan of future development.

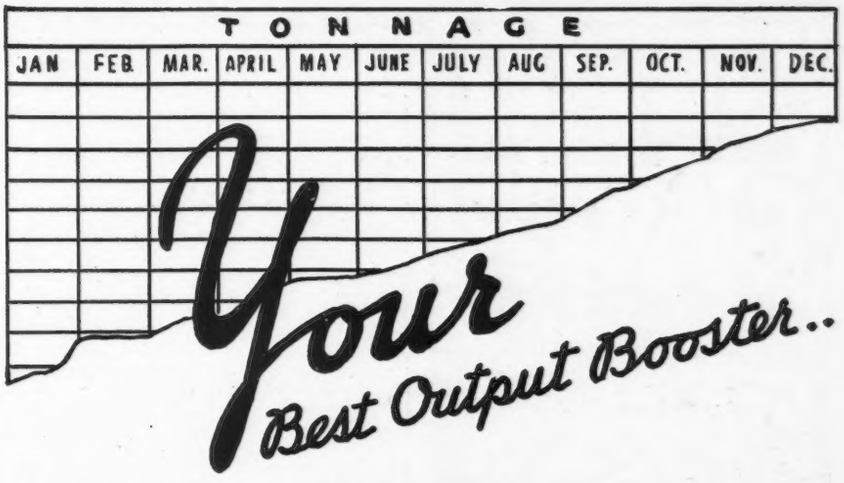
★ Vindicator Mining Co., prospecting east of the Lucky Friday mine, at Mullan, has opened a vein of galena ore for a length of 300 ft. in a lower tunnel development. The ore is in a shear zone some 50 ft. wide, but is not in commercial quantity on this level. The company expects to raise on the ore 400 ft. to surface to obtain air circulation for deep shaft work.

★ Sidney Mining Co., in the Pine Creek section of the Coeur d'Alenes, reports net smelter returns of $756,324 from ore production during 1946. During the year the company produced 24,562 tons of zinc-lead ore which averaged a mill feed of 14% in combined zinc and lead minerals. The Sidney company's new 300-ton flotation plant was first placed in operation last July and has been treating ore at the rate of 4,000 tons per month. The management expects to increase this production to 6,000 tons per month during 1947.

★ Henry L. Day, manager, reports in the annual summary of the Tamarack & Custer Consolidated Mining Co. that a profit of $63,328.17 was made during the year after deducting all charges. The company paid one dividend of $50,000 in 1946 and has a total dividend record of $2,792,123.52.

"Lateral development in the Tamarack mine," says the report, "was much more extensive in 1946 than in the preceding year. Some work was done on all levels from the 400 down to the 2,400, but most progress was made on the 2,200 and 2,400, the deepest levels in the mine. The most important disclosure was on the 2,400 in a sill length of 600 ft. of average width and very good-grade ore which has not as yet been prospected west of a hitherto unknown fault, possibly not of major consequence. Plans are being carried out for continuous intensive development in 1947.

★ The annual report of Federal Mining & Smelting Co. shows net earnings of $1,188,105.42 for 1946, compared with $1,159,555.81 in 1945. In the report Francis H. Brownell, president of the company, mentions that during the year 1946 the Government continued the so-called premium payments

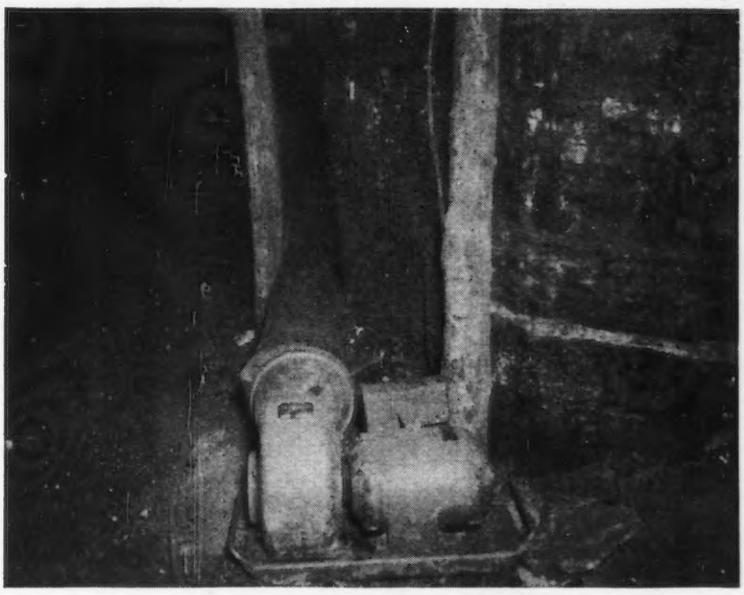


Fresh Air at the Working Faces

ABC products provide the most dependable and economical means of delivering a continuous supply of fresh air to the working zones; enabling the men to get out more tonnage. The most important fact in mine ventilation is that only the fresh air which reaches the men at work really counts.

MINEVENT TUBING increases output by delivering fresh air right where it is needed, without waste. Patented couplings and hangers facilitate installation or removal. Made in 3 grades of tough material that withstands repeated handling, flame, fungi and leakage. Sizes 8" to 36". Furnished in long lengths that can readily be cut to size.

ABC JUTE BRATTICE CLOTH assures more fresh air for the men by sealing off inactive areas. Treated with non-injurious chemicals to resist flame, fungi, leakage and shrinkage, this rugged fabric gives long service in mines. Made in the 2 grades.

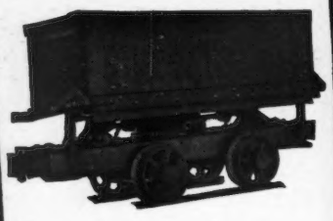


Write for samples and full information

AMERICAN BRATTICE CLOTH CORP.
WARSAW, INDIANA

CARD CARS

For "Lowest Cost per Ton Mile Haul"



CARD CARS ARE ENGINEERED TO THE JOB . . . DESIGNED AND BUILT TO BEST MEET SPECIFIC CONDITIONS IN EACH MINE.

Ask for Catalog 40 . . . today.

C.S. Card Iron Works Co.
Denver, Colorado

Idaho *(continued)*

on the production of lead and zinc. The total amount of premiums included in the company's earnings for the year 1946 was $2,149,012.93. In the year 1945 it was $2,190,091.71. The law under which premium payments are made will expire on June 30, 1947.

During and since 1943 the company has milled 482,892 tons of material from the Morning mine dumps and tailings piles which averaged about 1.1 oz. of silver, 1.4% lead, and 1.0% zinc. The cost of steam-shovel operations and trucking this material to the mill was 35c. per ton. This operation was necessitated by an acute manpower shortage which prevented normal mine production.

MONTANA

North Butte operating through Granite Mountain shaft — Zinc mines reopened by Anaconda

★ The annual report of North Butte Mining Co. for 1946 also covers operations for the first three months of 1947. The operating agreement which the company had with Anaconda Copper Mining Co. during the war years was terminated on March 31, 1946. Under this agreement, during the first three months of 1946 North Butte produced 33,683 dry tons of ore containing 2,234,978 lb. of recoverable copper, 54,085 oz. silver, and 63.7 oz. gold, giving net smelter returns of more than $124,000. Since April 1, 1946, the company has been rehabilitating its Granite Mountain shaft, repairing the surface plant and equipment, cutting five new stations, and carrying on development work. Production was resumed in December, 1946. Production during March, 1947 was estimated at 9,600 dry tons of ore containing 671,695 lb. of recoverable copper, 16,329 oz. silver, and 11 oz. gold. Operating figures for 1946 show a net loss of $290,579 after charging off non-recurring costs of rehabilitation amounting to $327,312. Paul A. Gow, of Butte, is president and general manager and Howard D. Smith, of San Francisco, is consulting engineer.

★ Peacock Mines, Inc., headed by Ernest Ecklesdafer and M. C. Beck, of Drummond, expected in March to resume operations at an early date on its Magnet and Hatta claims, in the Dunkelberg district, Granite County, 16 miles south of Drummond and close to the mines of Forest Rose Syndicate. The properties have not been operated since 1906, having shut down on account of the inseparable amounts of zinc in the lead-silver ores. A new road is to be built to the properties, modern machinery and electric power will be installed, and a 400-ft. inclined shaft reopened.

★ Over 15,000 employees and their families attended the opening of the new Anaconda Employees' Club in Butte on March 16. Three hundred company executives and employees and their wives acted as a reception committee. One of the most luxurious recreational clubs in the West, the club is housed in the old Thornton Hotel building, which was completely refurbished and the inside entirely rebuilt.

★ Elkhorn-Beaverhead Mines, Inc., a Maryland corporation, has filed to do business in Montana at properties formerly operated by the Boston-Montana group of properties in Beaverhead County. Harry C. Evans, formerly manager of the Lexington Mines, at Neihart, and recently with the U. S. Government in Washington, D. C, is vice president and manager, with headquarters at Dillon.

★ More than 500 guests attended a stag community dinner held in honor of D. M. Kelly and E. S. McGlone at the Finlen Hotel, Butte, on March 11. Kelly, recently resigned as vice president, is now administrative consultant of Anaconda Copper Mining Co. McGlone succeeded Kelly as vice president in charge of Western operations. William Meyer, prominent Butte attorney, acted as toastmaster. McGlone reiterated his optimism on the future of Butte mine production and life, as recently mentioned in these columns, and Mr. Kelly reminisced on his 44 years of life in Montana.

Commenting on current operations at Butte, McGlone said that 500 men are now engaged in mining manganese, as the steel companies have found the manganese nodules, first produced by Anaconda to aid the war effort, the best available manganese product for metallurgical purposes. About 600 tons a day of very low-grade manganese ore is being treated from the dumps of the Emma mine, along with ore from the Emma and Travonia mines which assays about three times the content of the dump material. The company is also treating 1,200 tons a day of zinc ore from the old Alice mine dump. In the last six months working forces have been augmented by 1,100 men, warranting the reopening of the Anselmo and Orphan Girl zinc mines. The Badger zinc mine will be reopened when additional manpower becomes available, McGlone stated, adding that the company could use 2,000 more men in its Butte operations and that there is more known metal in Butte Hill than at any time since its discovery, the problem being to recover it all profitably. He emphasized the need for new homes in the community.

★ Montana Onyx Corporation is mining a new and unique form of onyx, of various colors, at its 340-acre property on Sweetwater Creek, 20 miles southwest of Alder, in Madison County. The raw onyx is cut and polished at the company's plant in Butte and the finished product used

for outside and inside building, decorating, and the manufacture of novelties.

★ Alta Mines, Inc., will take over and operate the old Alta properties in the Wickes - Corbin district, Jefferson County, which in the past have produced more than $33,000,000 in gold, silver, lead, zinc, and copper. The new company is headed by E. W. Hyde, of Vancouver, Wash. L. S. Ropes, of Helena, is manager.

★ Saranac Mining Co., operating three groups of properties near Maxville, Granite County, is planning to build a heavy-density process mill to handle 400 tons per day of lead-zinc-silver ores.

★ Officers of the Mining Association of Montana for 1947, elected in January, are: President, A. V. Taylor, Jr., Philipsburg, president of the Taylor-Knapp Co.; first vice president, Gailen T. Vandel, Helena, chief mining engineer for Porter Bros. Corporation; second vice president, R. B. Shelledy, Garrison, president and general manager, Montana Phosphate Products Co.; chairman of the executive committee, Dr. Francis A. Thomson, president, Montana School of Mines; secretary-treasurer, Carl J. Trauerman, of Butte, mining engineer. Arrangements for the ninth annual summer meeting of the association at the Finlen Hotel, Butte, on Aug. 3 and 4, are partly completed, and speakers so far announced include Chancellor George A. Selke of the Greater Montana University, and J. N. Leggat, of Boise, Ida.

UTAH

MMSW locals form secessionist committee — Iron-ore output records sharp increase

★ A regional movement to secede from the International Union of Mine, Mill & Smelter Workers, CIO, which burst forth March 11 in Salt Lake City following the resignation of Reid Robinson as international president, has been quiescent outwardly since appointment by Philip Murray, CIO national president, of a committee to investigate affairs of the MMSW.

Dan Edwards, former international board member who was defeated for re-election in what he claims was a "rigged" election last fall, said Robinson's resignation was "a typical political maneuver which doesn't change anything." Maurice E. Travis, of Martinez, Calif., new MMSW president, is of the same political stripe as his predecessor, Edwards said. He telegraphed John J. Mankowski, Eastern secessionist leader, that a majority of Utah locals soon would take action to withdraw from the international and would seek some other form of CIO affiliation.

LORAIN ROLLED PLATE LININGS
Last Longer

because —

. . . they offer exceptionally high resistance to abrasion.
. . . plates and lift bars are reversible.
. . . lift bars are renewable at partial lining costs.

U·S·S LORAIN GRINDING BALLS give uniformly superior results

Forged from new steel and accurately heat-treated to take the punishment of abrasion and impact throughout long, heavy runs, these grinding balls maintain a standard of quality that insures uniformly superior results. Available in all standard sizes from ¾" to 5" in diameter.

THE net result means reduced maintenance costs, fewer replacements, more grinding time.

But longer service life is just one of the reasons why it will pay you to use U·S·S LORAIN ROLLED PLATE LINING in your grinding mills. For example, their high strength and toughness often make possible the use of thinner plates, thus increasing mill diameter and resulting in greater output.

They go in faster, too!

Their simplicity of design and ease of handling speeds up installation. In some large mills as much as 12 man-days have been saved.

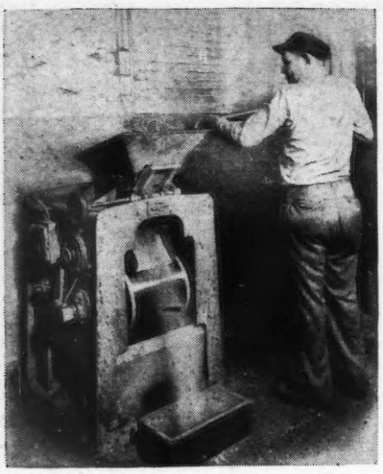
This superior plate lining is available in the diameter, length and thickness best suited to your operating conditions. It will produce better results more economically no matter what you grind. U·S·S LORAIN ROLLED PLATE LININGS are available through leading grinding mill manufacturers whose names will be furnished on request.

U·S·S LORAIN ROLLED PLATE LINING

CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago

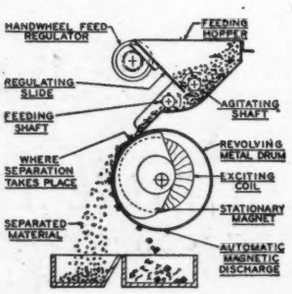
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York
7-385

UNITED STATES STEEL



MAGNETIC Separators for RECLAIMING METALS

Scrap metal values go up when you use this improved Stearns Type "L" Magnetic Separator for reclaiming your brass, aluminum, babbitt and other secondary metals from turnings, borings, chips and metal refuse. Automatic, efficient, economical, a definitely profitable investment.



Stearns MAGNETIC MFG. CO.
624 S. 28th St.
Milwaukee 4, Wis.
SEPARATORS • CLUTCHES • MAGNETS

Utah *(continued)*

Arthur Ashby, MMSW international representative, announced two days later the appointment of an anti-secessionist committee. W. J. Madill, chairman of the committee, together with V. B. Reese, secretary, and Charles R. Brooks, chairman of publicity, all opposed Robinson's re-election last fall.

★ A copper shortage threatens the United States within the next year and a half even if the copper tariff is suspended temporarily, E. T. Stannard, of New York City, president of Kennecott Copper Corporation, said on March 24 in Salt Lake City.

"Unpredicted heavy demand for copper from European countries, with unprecedented demand from domestic users, accounts for the rapidly approaching shortage," he said. "While industry, which has been fed by the stockpile, hasn't as yet felt the pinch, it will when the reserve peters out, which probably will be the latter part of April."

★ A petition for rehearing of cases dealing with the inclusion of Federal subsidy payments in computing mine occupation taxes and net proceeds taxes was filed with the State Supreme Court on March 31 by 13 Utah mining companies. The petition charges that the court, in ruling that the subsidies were taxable erred in four particulars: (1) in construing the tax law so as to render the net-proceeds method of valuation unreasonable; (2) in disregarding material facts stipulated between the parties; (3) in disregarding a section of the law limiting the definition of gross proceeds to exclude payments of the subsidy type; and (4) in its construction of value as related to the State's mine occupation-tax laws.

★ Following increased activity at the Geneva Steel Co. plant, Utah iron-ore production for January was up 41% over that for December, and February ran 32% ahead of January, U. S. Bureau of Mines figures show. February production was 289,314 tons of iron ore. For the year 1946, production was 1,322,000 tons, compared with 1,931,749 tons in 1945.

★ Ohio Copper Co., of Utah, produced less ore in 1946 and had a net loss of $30,224 last year, compared with a net profit of $6,838 for 1945, Percy H. Kittle, president, reports. The tailings mill at Lark produced 2,209,305 lb. of copper, 350 oz. of gold, and 3,883 oz. of silver, compared with 2,287,521 lb. of copper, 370 oz. of gold and 3,930 oz. of silver in 1945. The Big Indian mine, near LaSal, shipped 1,025,433 lb. of copper in concentrate, less than in 1945, but the grade of ore increased from 1.68% to 1.89%.

★ Chief Consolidated Mining Co., at Eureka, earned a net profit of $78,-510 in 1946, compared with a net loss of $21,516 the previous year, Cecil Fitch, president, reports. Ore production increased from 75,109 to 85,128 tons and average gross value rose from $23.19 to $27.92 per ton for 1946 compared with 1945. The 1946 production included 9,506,282 lb. of zinc; 6,793,721 lb. of lead; 22,476 lb. of copper; 1,522 oz. of gold; and 380,-045 oz. of silver.

★ Valuation of Kennecott Copper Corporation mines in Utah for 1946, as submitted to the State Tax Commission, is $50,758,567, compared with $66,296,639 for last year. The decline in valuation, which is based on net proceeds, resulted from a six-month strike.

★ The Department of the Interior will cancel no more applications for potassium and magnesium permits or leases in central Utah until Congress has an opportunity of determining what disposition shall be made of these lands, Joel Wolfsohn, assistant chief of the Bureau of Land Management, said on March 5 at a House of Representatives public lands committee hearing in Washington, D. C.

★ Emerald Mining Co., Elko, Nev., with a bid of $920,000, submitted the highest of three offers to purchase the Kalunite, Inc., plant south of Salt Lake City, War Assets Administration officials announced on March 20. Edgar R. Larsen, executive vice president, who signed the bid, said the plant would be utilized for refining various ores, including beryllium, lead, chrome, mercury, bismuth, and uranium oxide. No extensive conversion would be needed for the contemplated uses except the addition of machinery and equipment now owned by the company, the proposal indicated. The company owns numerous mining claims in Nevada and in Washington County, Utah.

The other two bidders were Sterling Chemicals Inc., of New York City, $355,000, and J. R. Simplot Co., of Caldwell, Ida, $255,000. Both indicated intentions to use the plant for the production of commercial fertilizers such as phosphates and potash.

The plant was built in 1942 at a cost of about $5,600,000 and was used in an attempt to work out commercial production of alumina and by-products from alunite ores near Marysvale, Utah.

★ Park-Utah Consolidated Mines Co., of Park City, earned net income before taxes and depreciation of $119,-649 in 1946, compared with $146,468 in 1945, says the annual report released by Paul H. Hunt, vice president and general manager. Current liabilities declined from $288,659 to $104,476 and working capital increased to $1,258,598 from $1,158,702 during the year.

Other data for 1946, with 1945 figures in parenthesis, follow: tons mined, 28,400 (27,896); gold, oz., 658 (683); silver, oz., 309,335 (315,-188); lead, lb., 5,002,882 (6,486,316); zinc, lb., 4,541,658 (5,590,890); copper, lb., 187,456 (157,423).

COLORADO

Vanadium Corporation to reopen Naturita mill—New Hope mine at Silver Cliff is developed

★ Cresson Consolidated Gold Mining Co., at Cripple Creek, had a net loss of $61,619 for 1946, compared with net loss of $24,174 in 1945. The profit-and-loss statement showed that at least $50,000 has been spent to date repairing damage from last July's disastrous cave-in, and Merrill E. Shoup, president, stated that another $50,000 would have to be spent before salvage work is completed. The 20th level of the Cresson mine is now drained, and Shoup said preparations are under way to start exploration of the level. Production during 1946, despite shutdowns from Jan. 1 to April 1 and from July 22 to Oct. 21, totaled 16,973 tons, with gross value of $199,789 and average value per ton of $11.77. The water level in the Cresson mine at present is approximately 8 ft. below the 20th level. As soon as the necessary labor can be secured it is the intention to rehabilitate the 20th level and to drive a lateral from the Portland shaft at the level of the Carlton drainage tunnel to drain the lower levels of the Cresson mine.

★ Phil Markley, of the Markley Mining & Exploration Co., of Philadelphia, Pa., has leased the Tenderfoot Hill mining properties, at Cripple Creek, belonging to the estate of the late Mrs. Verner Z. Reed. Shirley Johnson is in charge of mining, and the properties will be opened for split-check leases.

★ Climax Molybdenum Co. and subsidiaries reported 1946 net profit of $2,552,555, or $1.01 a share, compared with $7,167,701, or $2.84 a share, in 1945. The report stated that the 1946 net is after giving effect to a change in method of valuing inventories of finished products at a cost figured on a last-in, first-out basis. Had the average cost basis been used as heretofore, it said, net profit would have been $2,942,393 or $1.17 a share.

★ Production of lead and zinc concentrates at the John Hamm Mining & Milling Co., Leadville, during 1946 approximated the peak output of 1944. The output had fallen off in 1945 about 15%, but in 1946 recorded a 22% increase. The mill employs an average of 25 men. Crude ore is received from the Wolftone, and A Y and Minnie dumps. The lead and zinc concentrates are trucked to the Resurrection mill. John Hamm is general manager.

★ At the Little Johnnie mine, at Salina, Aaron Stromberg and W. R. Griswold have sunk 150 ft. below the tunnel level on the Sweet Home vein. Drifting on the vein has shown ore as

MORRIS
TYPE "R" SLURRY PUMP

The advanced design of this pump has all the performance requisites that engineers and operating men want. And we can prove it!

Only the Morris Type "R" Slurry Pump Has These Four Exclusive Features!

1. *The gland is under suction pressure only.* This feature practically eliminates packing troubles.

2. *The Type "R" Morris has no internal bolts or studs, no troublesome fits or joints.* To reach the impeller you remove only four bolts.

3. *You can remove the impeller without disturbing the piping.* This feature alone saves you considerable replacement and repair time.

4. *The shell is interchangeable for right or left hand rotation.* You can rotate the suction and discharge nozzles around the axis of the pump to positions in any of the four quadrants, a total of 72 combinations.

It's easy to install, dismantle, or maintain the New Morris Type "R" Slurry Pump. As a new installation or as a replacement, this pump will fit easily into your existing plant.

● The New Morris Type "R" Slurry Pump is being used successfully by many plants in handling ore concentrates, tailings, slag and residue from filters and classifiers. Operates on all types of caustic and acid mixtures containing abrasives or solids.

FREE!

Send for our free Bulletin on the Morris Type "R". It shows a new kind of easily understood performance curves . . . explains how Type "R" will fit into your specific operations. WRITE FOR THIS BULLETIN TODAY.

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Sales Offices in Principal Cities

MORRIS CENTRIFUGAL PUMPS

FASTER CUTTING ...with Clipper Masonry Saws

Your Special Size and Shape Brick or Concrete Block can now be "Tailor-Made" at a moment's notice!

The new Clipper Multiple Cutting Principle makes possible faster cutting of every masonry material regardless of hardness.

Here are a few typical examples of the speed and accuracy with which concrete products and fire brick can be cut.

This concrete block, converted into a special size, was cut completely in two in 19 seconds.

One of the many intricate cuts performed on first quality clay brick for heat treating furnaces —made in 8 sec.

Rotary Kiln Blocks, cut to size for "key" bricks in rotary kilns, require only 10 sec. for completion of cut.

Basic refractories for steel furnaces or cement kilns must be accurately installed. This magnesite brick was cut in 12 seconds!

CLIPPER MFG. COMPANY
2800 Warwick, Kansas City 8, Mo.

Colorado *(continued)*

strong as on the tunnel level and in the stopes above. A hoist is installed underground. Shaft pockets are in use for ore storage and a successful bottom-dump skip of Stromberg's own design is in operation.

★ Charles N. Bell and associates in the Virginus Mines Co. are operating the old Revenue mine, near Ouray, with production from the Cumberland and Virginus veins as the objective. The long Revenue crosscut is being retimbered. A battery locomotive and mucking machine are making good progress in handling the caved muck. R. S. Dunn, formerly in charge at the King Lease on the Camp Bird mine, is general superintendent. Eight men are employed. Results from diamond drilling are responsible for revived exploration of this oldtime producer of $40 million worth of silver, lead, and copper ore.

★ William Burgin, in charge of sampling on the Stratton Estate ground on Globe and Ironclad hills for Mines, Inc., at Cripple Creek, reports that 2,970 hand samples of 250 lb. each and 1,320 power-shovel samples of 5 tons each were taken during the past year. These included samples from the dumps, cuts into the sides of the hills, and some underground samples. As a check on the sampling the company shipped 52 cars, or 3,000 tons, of muck to the Golden Cycle mill. The sampling checked the mill results within one-hundredth of an ounce. Mines, Inc., a subsidiary of Ventures, Ltd., of Canada, of which Thayer Lindsley, of New York, is president, began testing the ground a year ago, and between March and December 1946 expended $75,000 on the project.

★ A new shaft has been sunk and the 250-ft. level reopened at the Bull Domingo mine, at Silver Cliff, discovered in 1879 and once a large producer of lead-silver and gold ores. Work is now in progress for the purpose of again opening up the lead-silver-gold ores and exposing the lead-zinc ores left in place because of the penalty on zinc. Work is also being done in a shallow shaft in another mineralized ore chimney 50 ft. from the old workings. The Bull Domingo Mines Syndicate, owner for the past 25 years, is headed by E. L. Laycock, president and resident manager.

★ Vanadium Corporation of America will reopen its mill at Naturita during the early part of May, according to D. W. Wiles, assistant general manager. The company plans to operate the mill only, leasing its mining claims in that section to individuals on a contract basis. The contractors will haul most of the ore from the mines to the mill. The plant at Naturita has been closed for 18 months.

★ Western Colorado has more than 2,000 square miles of mineral-bearing area containing radioactive, fissionable materials, of which only about 5% have been developed, Blair Burwell, vice president of the U. S. Vanadium Corporation, recently told students, graduates, and faculty at the Colorado School of Mines. Burwell, a Mines graduate of 1919, talked on the trend of postwar mining and problems of the immediate future in raw-material production.

★ Major Priorities, Inc., a Colorado corporation headed by F. W. Evans, of Joplin, Mo., president, and M. B. Marton, of Glendale, Calif., secretary, is developing the New Hope mine, some six miles north of Silver Cliff. The program includes the sinking of a two-compartment vertical shaft to a depth of 500 ft., then crosscutting to the known zinc-lead deposits. Evans, an independent operator in the Tri-State field, is dismantling a mill in that district for installation at the New Hope to give a minimum daily capacity of about 60 tons. The concentrates will be shipped to the Eagle-Picher smelter in Joplin, Mo. It is said this mine will soon employ from 50 to 60 men.

★ United Gold Mines Co., of Cripple Creek, had a net loss of $62,006 in 1946, compared with a loss of $406 in 1945, Merrill E. Shoup, president, reported to stockholders. President Shoup said that factors contributing to the 1946 loss were: increased costs of labor and material amounting to between 35% and 40% since 1940; limitation of development work because of the continued manpower shortage; disappointing results from the development work done during the year; and decrease in production from the Portland mine during the year. Total production during 1946 was 149,366 tons of ore with a gross value of $700,629, or $4.69 per ton.

TRI-STATE

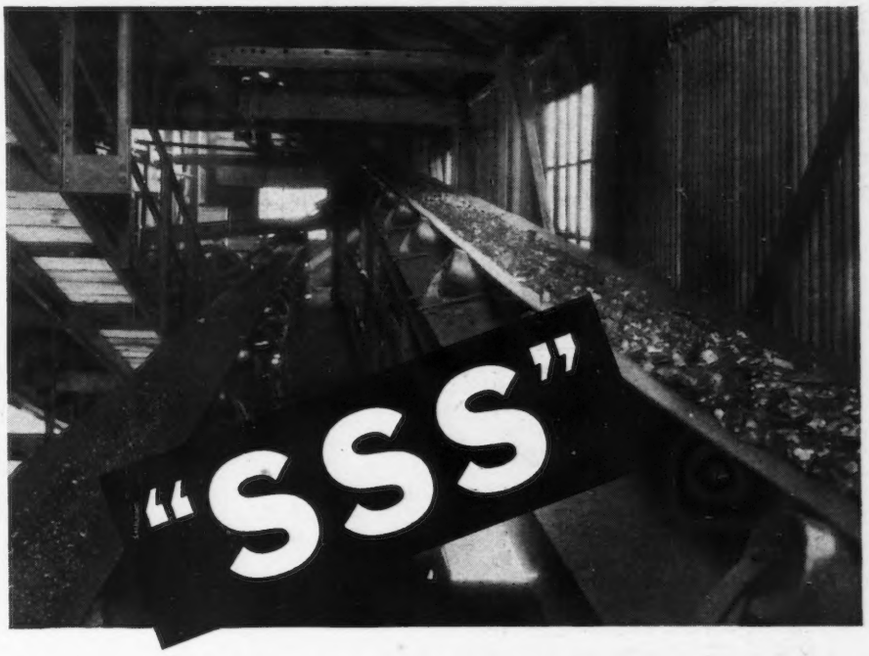
Producers Association issues brochure—Woodchuck, Gascho, and Olsen mines close

★ An elaborate brochure pleading the case of the Tri-State mining industry as the largest, single marginal zinc-lead ore-producing area in the world has been issued by the Tri-State Zinc & Lead Ore Producers Association. In the foreword, it is pointed out that "a healthy, going, mining industry is essential to our country's security," and that the district is "the outstanding example of the problem of saving our country's marginal zinc-lead reserves." Fourteen points are enumerated in the summary, as follows: (1) The U. S. faces immediate shortages of zinc and lead; (2) Zinc and lead are vital to national economy and security;

(3) Foreign production cannot supply our needs; (4) The Tri-State District has known marginal reserves of 50,735,500 tons of zinc-lead ores; (5) These marginal reserves represent 8% of our zinc and 2.5% of our lead; (6) Marginal reserves of the Tri-State field also represent between 1½ and 2 years of the life expectancy of known domestic reserves; (7) The Tri-State district is now supplying 25% of U. S. zinc production and 7% of U. S. lead production; (8) Tri-State mines cannot continue to operate at open-market prices in the face of low metal recovery, high operating costs, and inadequate tariff; (9) Vital marginal minerals cannot be conserved by leaving them underground; (10) Abandonment would result in flooding of mines, loss of machinery and equipment, and the irretrievable loss of trained miners and "know-how"; (11) Mine flooding would result in sulphate contamination of the mine water, which, if pumped out at a future time, would create stream pollution; (12) World prices would rise if these reserves are lost, thereby subsidizing foreign mining; (13) In the event of emergency a vast expenditure of money and time would be required to reopen the mines and to remobilize trained manpower; (14) The effectiveness of the Premium Price Plan has already been proved. Copies of the brochure are available at the association offices.

★ The production record of one of the oldest and richest mines in the Picher area, which was closed the latter part of March, presents an interesting example of what premiums have done toward the conservation of ore reserves of the district. H. G. Weidman, of Baxter Springs, manager of Weidman Mining Co., announced the closing of the old Woodchuck mine, a half-mile south of Cardin, and, together with Robert Fulton, of the U. S. Geological Survey, furnished production data. From 1917 to 1946, inclusive, 147,146 tons of zinc concentrates and 30,230 tons of lead concentrates were sold from the mine, with a combined value of $8,598,844, or an average of $48.48 per ton of concentrates. During the premium price payment years, 1942 to 1946, inclusive, the mine's sales were 5,498 tons of blende and 2,311 tons of galena, at an average price of $112.91 a ton for combined zinc and lead, and the combined recovery of lead and zinc averaged 3.22%, contrasted with a peak recovery in 1924 of 10.40%. Thereafter recovery trended steadily downward.

★ The Gascho mine of the St. Louis Smelting & Refining Co. and the Olsen mine of the Waco Mining Co., both in the Waco mining field, have been shut down because of the low tenor of ore, according to Robert L. Banes, Jr., of the former company. Employment of nearly 100 men was affected by the closing of the two properties. St. Louis S. & R. Co.'s No. 9 mill will continue to handle output from



THE CONVEYOR BELTING ESPECIALLY BUILT FOR

Super-Severe Service . . .

"SSS" has an unequalled reputation for *long-haul* economy on ores, crushed limestone up to 8", rough slag, run-o'-mine coal and similar materials, wet or dry. Specifications for cover thickness, number of plies, weight, etc., determined by specific requirements.

While modern machines have their important part in the construction of "SSS" belting, the outstanding *quality* of the product is created by the hands and minds of Goodall belt builders . . . skilled craftsmen who have traditional pride in their work and in the high standard of reliability which the name Goodall signifies.

★ ★ ★

Contact our nearest branch for complete information on "SSS" and other Goodall belting; hose, boots and clothing.

GOODALL RUBBER COMPANY . . . INCORPORATED

THE GOODALL-WHITEHEAD COMPANIES

Philadelphia • Trenton • New York • Chicago • Pittsburgh • Boston
Los Angeles • San Francisco • Seattle • Salt Lake City • Houston

Factory—Trenton, N. J. Established 1870

Tri-State *(continued)*

Waco's High Five mine and the Oscar Bennett Nos. 1 and 2 mines of the Stotts City Mining Co., south of the Waco mill, Banes said. Officials of the Cardin Mining & Milling Corporation also announced the permanent closing of the company's No. 2 tailing plant, at Picher, employing approximately 30 men. It was stated that "the rising cost of labor and supplies have made the operation economically unsound."

NORTH CAROLINA

Mica operators and Government confer in anti-trust case

★ Attorneys representing a group of large-scale mica operators in North Carolina who have been charged with conspiring to violate the Sherman antitrust laws conferred in the Federal Court at Charlotte on March 11 with U. S. district attorneys in an attempt to arrange trial or settlement of the charges. The case was called into court before Judge E. Yates Webb, who suggested the conference as a means of reaching a tentative disposition of the case.

The defendants, who were indicted by a Federal Grand Jury at Asheville last summer, and who have asked for a bill of particulars, are: Wetground Mica Corporation, Inc.; Concord Mica Corporation; English Mica Co.; Franklin Mineral Products Co.; Richmond Mica Corporation; Ashville Mica Co.; Land & Mineral Co.; Western Carolina Mica Co.; A. O. Schoonmaker Insulation Co.; New Hampshire Mica & Mining Co.; Connecticut Mica & Mining Co.; Eugene Munsell Co., Inc.; and Huse Liberty Mica Co.

★ Fire on the night of March 21 destroyed about two-thirds of the Bradley Mica Co. mine plant near Franklin. Andy Buchanan, superintendent, estimated the loss at between $20,000 and $25,000. The mill house, washing plant, and storage room were destroyed. Owned by James Preston, Jr., and Frank Lee, of New York, and Charles F. Zieseniss, of Paris, France, the plant employs between 20 and 25 persons and at one time was the largest in the world producing scrap mica. It will be rebuilt.

MICHIGAN

Isle Royale operations may end this year — Lake Linden power plant to be modernized

★ The Quincy Mining Co., which is operating a reclamation plant at Mason, on Torch Lake, Houghton County, treated 1,006,415 tons of waste sands during the past year, from which were recovered 5,052,549 lb. of refined copper for an average of 5.02 lb. per ton. Approximately half of this tonnage came from the richer part of the sand pile and the remainder from sands carrying approximately 4 lb. of recoverable copper per ton. Most of the better-grade tailings have been treated, and the plant must depend largely on the lower-grade sands for future operations. The average price received for the year's production was 20.95c. per pound.

The reclamation plant was financed by the Reconstruction Finance Corporation, which advanced $1,220,342. The greater part of this loan has been repaid. The balance of $209,563 should be paid this year. Profit during the year was $416,758.34. After depreciation and depletion charges at both the mine and reclamation plant, net profit amounted to $20,523.74.

★ Isle Royale Copper Co. will probably suspend operations some time this year. Mining conditions are becoming more difficult due to the shrinkage of ore reserves in the territory tributary to No. 5 shaft. Operations consist entirely of stoping out ore reserves; no development work is being done. A total of 6,502,671 lb. of refined copper was produced in 1946, an increase of 16% over the record for the last year. Production costs were 19.295c. per pound delivered. Depletion amounted to 1.3772c., bringing the over-all cost to 20.67c. per pound. The Premium Price Plan enabled the company to make a profit of $117,134.60 in 1946 before depletion charges and Federal income tax. Net income was $27,792.27.

★ Calumet & Hecla Consolidated's power plant at Lake Linden will be modernized to reduce costs. Present coal consumption per kwh. is in excess of 2 lb. As the price of coal has increased from $2.70 per ton delivered at Lake Linden in 1913 to a present cost of $7.33 per ton, it has become imperative to make the plant more efficient. An investigation covering a period of more than three months by the Chicago firm of Vern E. Alden Co., consulting engineers, determined that a saving of approximately $300,000 per year could be effected by making certain changes. The proposed modernization will require about two years to complete. The principal installation will be a pulverized-coal-fired boiler, which will be erected at the south end of the plant. This boiler is rated at 180,000 lb. of steam per hour at 850-lb. pressure and 825-deg. temperature.

ALASKA

Net income tax to be levied on mine production — New mill to operate at Midas

★ A graduated net income tax on mining production has been passed by the Alaska Legislature. Both the Senate and the House overrode a veto of the bill by Governor Ernest Gruening in what is reported to be the first instance of failure to sustain an Alaskan governor's veto.

Governor Gruening, in his veto message, described the mining tax bill as "objectionable and in my judgment decidedly contrary to the best interest of the Territory of Alaska." He said the bill would "tend to deprive the Territory of any likely prospect of revenue from mining if and when the industry again goes into more active operation."

The new tax provides for a levy against net income and royalty amounting to 4% on each $10,000, up to $30,000, 7% on the next $50,000, and 8% on over $100,000. Allowance is made for depletion.

A Prospectors' Aid bill was shelved by the Senate in early March by indefinite postponement, thus killing it.

★ A. L. Howard, manager of Alaska Gold & Metals Co., went to the company's mine, on Prince of Wales Island, near Ketchikan, in March, to begin rehabilitation work in hopes of resuming operations on the copper property this summer. The company has a 300-ton plant, which has been closed since the early part of the war. Some gold was also produced. Howard said that if plans develop satisfactorily about 40 men will be employed on the Saltchuck, and 25 on the Rush-Brown property.

★ A new mill will be constructed on Old Miner's Gold Mining Co.'s ground at Midas, in the Gold Circle district, according to Charles Kassebaum, who holds a lease and option on the property. Development work done in 1946 including the sinking of a new shaft and sampling of a large tonnage of low-grade ore left by former leasers. The property adjoins the Elko Prince, formerly a substantial producer.

CANADA

Central Cadillac's new mill to start—Siscoe operates silver property — Production planned by Reeves MacDonald

★ Favorable results continue to be shown as work advances in drilling the nickel-copper deposits at Lynn Lake, 120 miles north of the Sherritt Gordon mine, in northern Manitoba. Diamond drills have indicated the "A," "B," and "E" anomalies to contain 5,000,000 tons of ore averaging 1.18% nickel and 0.6% copper. A mile to the south, 20 of the first 21 drill holes on the "L" anomaly indicate a large body of high-grade ore. Here the combined nickel-copper content is estimated at 4% for upwards of 2,000,000 tons. Drill exploration has not yet started on several other anomalies that are be-

lieved to have ore-making possibilities, as reported by Eldon L. Brown, president of Sherritt Gordon Mines, Ltd.

★ Labrador Mining & Exploration Co. has built an airport at Knob Lake, giving convenient access to known iron deposits to facilitate year-round work. This winter 70 tons of materials have been taken in by plane, Dr. J. A. Retty reported at the annual meeting of Hollinger Consolidated Gold Mines. Iron content of 55% to 60% has been indicated by drill holes to a maximum depth of 312 ft. In areas blocked out by drilling to date it has been possible to make a conservative estimate of 21,000,000 tons of ore. Large additional tonnages are expected to be indicated next summer under an enlarged program of exploration by churn drills.

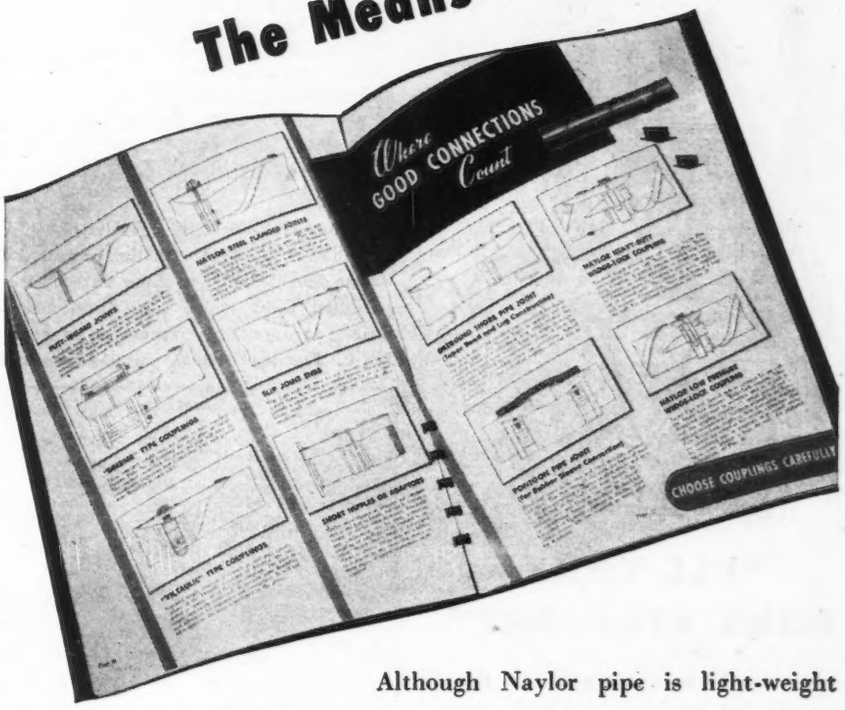
QUEBEC

★ Mill construction has been delayed at Malartic Gold Fields, Ltd., where the new 1,500-ton plant will be completed at an estimated total cost of $1,800,000. To the end of February $600,000 had been spent on the project. Developed and indicated ore in 1946 amounted to 3,610,000 tons, up from the 2,600,380 tons reported at the end of 1945. President M. A. Thomson reported the average grade of ore last year at $6.70 a ton and total 1946 bullion production of $1,395,978. John Metz is general manager.

★ Sigma Mines (Quebec), Ltd., reported a drop in 1946 net profits to $445,360, compared with $494,553 in 1945. Recovery per ton was down from $6.36 to $6.15, due to the lower price of gold. J. G. McCrea, general manager, reported ore reserves at the end of 1946 at 1,301,700 tons, compared with 1,349,700 tons the year before. Development work down to the 15th level amounted to 3,111 ft., plus 30,426 ft. of diamond drilling. Ten percent of the 289,949 tons of ore drawn from stopes was extracted from horizontal veins projecting into the walls from the main stopes. Lower-grade ore from the wide stopes has been mined during the period of labor shortage. Operating cost per ton advanced from $3.59 to $3.72, the major increase taking effect in December, when the wage rate was upped 10c. an hour. J. B. Redpath is assistant general manager.

★ Consolidated Central Cadillac Mines reports plans to start its new mill in May at 400 tons daily. In an effort to keep operating costs at a minimum, the mine is being completely mechanized through the use of nine slusher hoists, five mucking machines, and accessory equipment. It is planned to have 50 faces in ore when mill operations start. Diamond drilling recently has indicated five sulphide lenses in iron formation north of the main quartz-tourmaline structure. These lenses show an average width of 4.1 ft. and a cut grade of $11.83 for the

HOW NAYLOR PIPE OFFERS YOU The Means to Any End

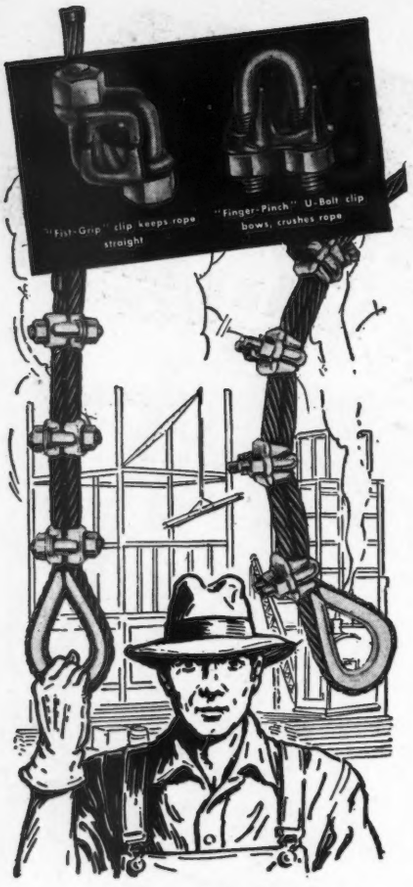


Although Naylor pipe is light-weight pipe, Naylor's wide variety of standard-weight ends enables you to use Naylor pipe with fittings and equipment common to industry. It is possible to change connections quickly from one type to any other as required. By careful selection of the Naylor coupling best-suited to your job, you can save time, work and money.

A section of the Naylor Catalog provides helpful information on the subject of pipe connections. If you have not already received a registered copy of Naylor Catalog, No. 44, it will pay you to write for it today.

Naylor

NAYLOR PIPE COMPANY
1243 East 92nd Street • Chicago 19, Illinois
New York Office: 350 Madison Avenue • New York 17, N. Y.



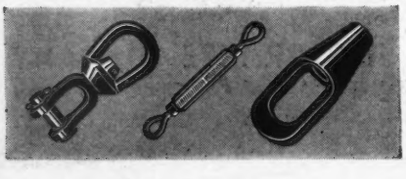
"I'LL TAKE MINE STRAIGHT"

A *straight* rope is a *stronger* rope ... and for maximum strength, rope makers *insist* that kinking and crushing be eliminated. U-bolt clips *always* deform rope ... particularly if they're "staggered". But LAUGHLIN "FIST-GRIP" CLIPS *insure* a straight rope because four flat bearing surfaces deliver uniform pressure over entire contact area ... rope *stays* straight — no reverse bends under load.

"FIST-GRIPS" are foolproof ... made in identical halves — can't be "staggered" ... nuts on opposite sides for quick, easy wrenching ... bolts and saddles drop-forged for strength and SAFETY. Look for LAUGHLIN'S "L" trade-mark at your supply house ... write for catalog to Dept. 5, The Thomas Laughlin Co., Portland 6, Maine.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



Canada (*continued*)

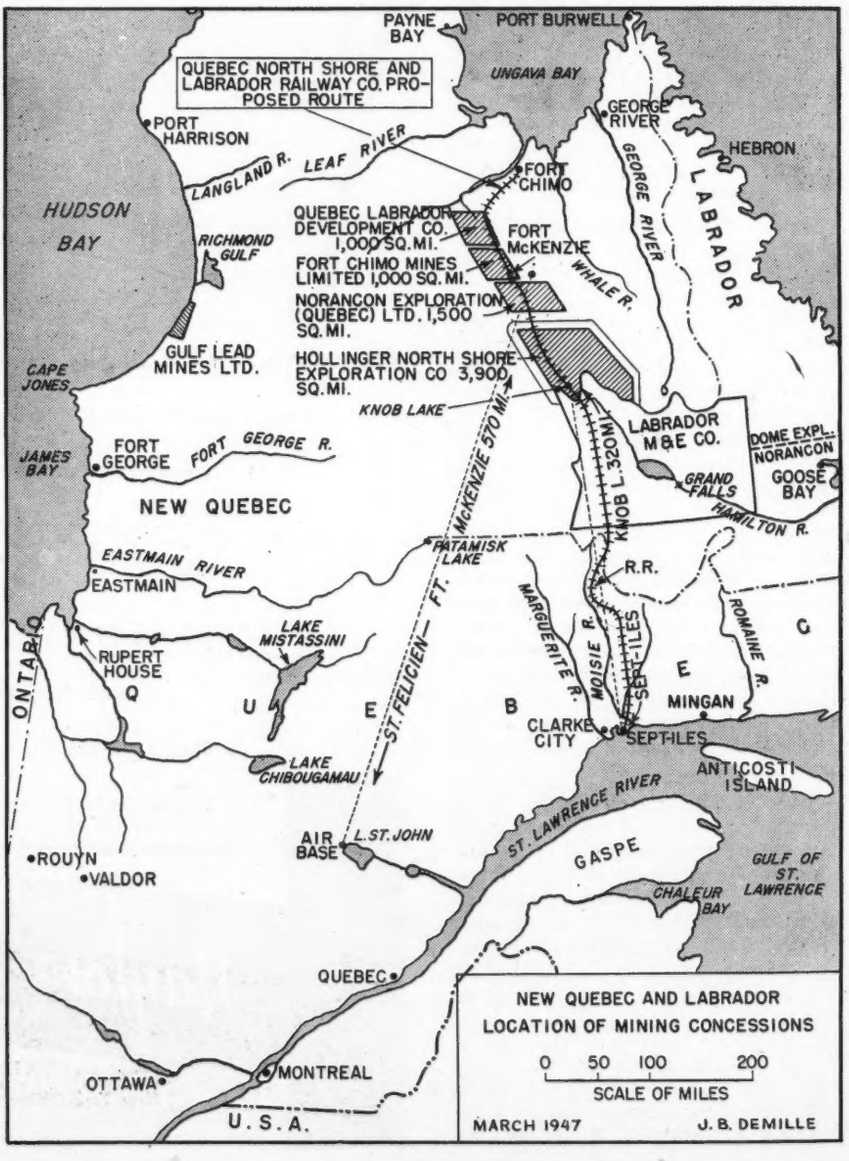
indicated 30,390 tons. The volume is expected to increase considerably as exploratory drilling continues from the 500-ft. level to below 750 ft. Gerald A. McTeigue is president and Frederick E. Hall is mine manager.

★ East Sullivan Mines is starting a large-scale exploratory program of diamond drilling and lateral work, following completion of the 5-compartment shaft to a depth of 455 ft. Each level is to be opened up by 1,200 ft. of drifting to check earlier results of diamond drilling. This summer information is expected to be available for planning mill construction on a scale of upwards of 2,000 tons a day for the recovery of gold, copper, and zinc. The project is fully financed. L. T. Postle is mine manager and Drs. James and Buffam are consulting engineers.

★ Shaft sinking at Regcourt Gold Mines was expected to be completed in April, at a depth of 520 ft. Two high-grade veins discovered in sinking are to be tested by the first lateral work on the 200 and 300 levels. These two veins vary in width from 1 to 3 ft.; 25 samples from one vein averaged 3.3 oz. gold per ton; 38 samples from the other averaged 1.14 oz. per ton. Col. R. M. Courtney is president and J. L. Jowsey is mine manager.

★ Suzorite Co., Ltd., formed in 1944 as a subsidiary of Siscoe Gold Mines, reports that production of ground phlogopite flake mica was started last September. Continuous output on a limited scale has been maintained to supply several building-material com-

MINING CONCESSIONS covering the iron-bearing region of New Quebec and Labrador are shown, together with the projected route of the proposed new railroad from Sept Iles to Fort Chimo, via Knob Lake. Labrador Mining & Exploration Co., Hollinger Consolidated Gold Mines subsidiary, estimates 21 million tons of ore blocked out by drilling to date. Iron content of between 55% and 60% has been shown to a depth of 312 ft. The 1947 season will see great activity in this region.



panies. The mica deposit is in Suzor Township, from which shipments are made to a treatment plant at Shawinigan Falls. Work is under the supervision of R. G. Walsh, general manager of the Siscoe mine.

ONTARIO

★ Siscoe Metals, Ltd., a subsidiary of Siscoe Gold Mines, reports tuning up the mill at the Miller Lake-O'Brien silver property in the Gowanda district. Purchase of the mine last year was followed by construction of a 100-ton mill. Silver recovered by the end of 1949 is expected to repay the capital expenditure if the present price of the metal prevails. Ore extensions of previously mined areas have been located by diamond drilling, which has also outlined a new vein system 400 ft. below the 825 level. The new zone has an indicated length of 200 ft. Manpower shortage has delayed plans for deepening the shaft to 1,200 ft.

★ Clifford W. Michel, president of Dome Mines, Ltd., stated in the annual report for 1946 that net profit was $2,051,728, compared with $2,299,564 in 1945. Production was $5,448,935, up from the 1945 figure of $4,887,263, and average value per ton increased from $9.27 to $9.50, with recovery at 92.62%. Operating costs advanced from $4.66 to $5.24 per ton. Robert E. Dye, general manager, stated that present conditions make it profitable to mill caved material from previously abandoned shrinkage stopes. Ore reserves were increased to 2,498,000 tons. William H. Johns is general superintendent.

★ Sinking of the four-compartment shaft at Campbell Red Lake Mines has been completed to a depth of 600 ft. Intense underground development is reported to be in progress. Diamond drilling, amounting to 36,127 ft., outlined two zones of commercial-grade gold ore, about 500 ft. apart. The south zone is 1,300 ft. long. The length of the north zone is stated to be 600 ft. Because of the character of the deposit, no tonnage estimate has been attempted. Dome Exploration owns 57% of the capital stock. H. C. Young is mine manager.

★ Hard Rock Gold Mines reports a 1946 net loss of $86,392 after writing off prior development costs. Total production was reported by the general manager, R. G. McKelvey, at $717,557. Sulphide ore reserves dropped from 215,000 to 140,000 tons. The sulphide ore averages 0.197 oz. per ton, compared with 0.2 oz. per ton for the quartz ore, of which reserves include 12,000 tons. Thomas H. Rea is president of the company.

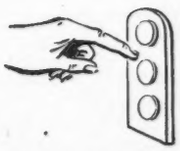
MANITOBA

★ Hudson Bay Mining & Smelting Co., Ltd., achieved the highest earnings in its history in 1946, the company's annual report discloses. Gross income for

I was looking ahead when I bought a 3½ H.P. AIRCOOLED Sheppard Diesel

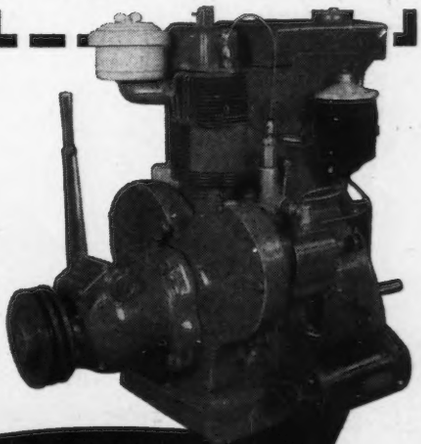
THERE ARE *cheaper engines. But, the rugged little Sheppard will be going strong long after the others would have worn out.*

NO ELECTRICAL IGNITION . . . *no carburetor . . . means a minimum of servicing and lower maintenance costs. Looking ahead over a period of years — that's important.*



BEING A FULL DIESEL, *the Sheppard starts easily and operates efficiently on low-cost domestic furnace oil. It produces no harmful or explosive fumes.*

I LOST *a plant when a spark ignited a fume-filled room. It won't happen again . . . not with the Sheppard on the job. That protection alone more than justifies its cost.*



The model 14 Aircooled Sheppard is available as a power unit or direct connected to a 2,000 watt generator. See it at your nearest Sheppard Distributor. We will forward his name on request. Also literature with complete specifications available.

R. H. SHEPPARD CO., INC.
12 Middle St., Hanover, Pa.

Sheppard DIESEL

DIESEL'S THE POWER . . .
Sheppards' the Diesel

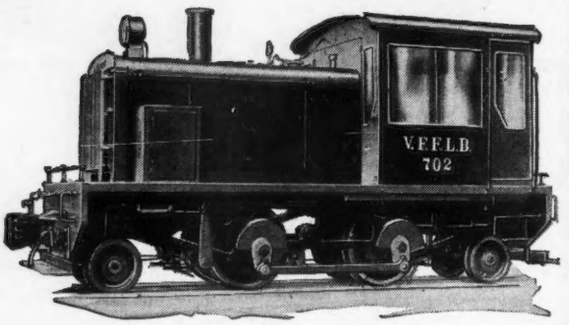
Generating Sets • 2,000 to 36,000 watts
Power Units • 3½ to 56 continuous H. P.

The ASSET VALUE *of Your* RAILS

—is dependent directly upon the performance of your haulage power units. That's why we recommend Davenport Better-Built Locomotives INDIVIDUALIZED to FIT your particular haulage requirements. You'll achieve new lows in ton-mile costs when you utilize the in-built stamina, responsive power and easy-to-operate controls of longer-lived Davenports. Our engineers will be glad to receive a description of your haulage conditions and submit reliable, money-saving recommendations.

DAVENPORT LOCOMOTIVES are Available in

STEAM
GASOLINE
DIESEL
with
MECHANICAL or ELECTRIC DRIVE



Leading and trailing trucks permit adequate speeds with SAFETY where track is uneven.

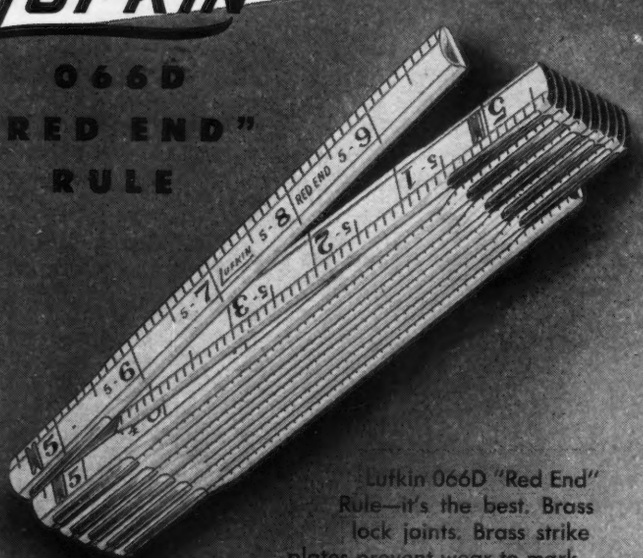
EXPORT OFFICE BROWN & SITES CO., INC. 50 Church St., New York Cable Address 'Brosites'

DAVENPORT LOCOMOTIVE WORKS
A DIVISION OF DAVENPORT BESLER CORPORATION, DAVENPORT, IOWA
ESTABLISHED IN 1900

Tendremos mucho gusto en enviarle un catalogo en Espanol describiendo las Locomotoras Davenport.

LUFKIN

066D "RED END" RULE



Lufkin 066D "Red End" Rule—it's the best. Brass lock joints. Brass strike plates prevent wear to markings. Rust-proof throughout. Prominent markings and glossy red ends. For free catalog write THE LUFKIN RULE CO., SAGINAW, MICHIGAN, New York City.

LUFKIN FOR DURABILITY

Canada *(continued)*

the year was $29,275,256. After the deduction of all charges, including Saskatchewan ore royalty of $1,044,933, taxes on income $5,370,000, and depreciation and depletion, profit amounted to $8,855,079, equivalent to $3.21 per share. This is in contrast to net earnings of $5,897,841 for the preceding year.

During the year 1,837,472 tons of ore was mined and treated, from which were produced the following refined metals: copper, 79,989,315 lb.; zinc, 102,656,828 lb.; gold, 143,282 oz.; silver, 1,839,426 oz.; cadmium, 166,333 lb.; and selenium, 121,729 lb. The pilot plant erected to devise a method for the treatment of the zinc-plant residue is reported to be yielding encouraging results. The stockpile of residue now stands at 652,947 tons.

★ Hudson Bay Exploration and Development Co., Ltd., continues active in outside exploration. At the property of Cuprus Mines, Ltd., 8½ miles southeast of Flin Flon, the three-compartment shaft has been completed to a depth of 615 ft. Recently drifting has reached the ore on the 400-, 500- and 600-ft. levels, and the work so far confirms the results obtained by diamond drilling. Two other base-metal occurrences under investigation by the company are at Wollaston Lake, Saskatchewan, and at Schist Lake, south of the former Mandy mine.

★ The annual report of San Antonio Gold Mines, Ltd., for 1946 reveals a net profit of $448,029, equivalent to 18.7c. per share. During the period 149,875 tons of ore was milled, yielding 43,819 oz. of bullion, or an average recovery of 0.292 oz. gold per ton. A total of 5,704 ft. of development work was completed. "A" ore was developed over a length of 1,165 ft., with an average width of 7 ft. "B," or marginal, ore showed a length of 261 ft. with an average width of 8 ft. A total of 10,723 ft. of diamond drilling resulted in a number of intersections of ore grade which will be investigated as lateral work progresses. A new hoistroom was excavated at No. 3 winze, and a new double-drum 48x72-in. hoist was installed. Work began on the erection of the headframe and bin substructure at No. 4 winze, which will eventually be extended to the 26th level at the 4,000-ft. horizon. Ore reserves stand at 720,000 tons, of which 104,000 are broken in stopes. Mine operating costs increased to $5.75. The operating cost per ounce of gold was $19.68.

The company has recently acquired the Gold Plant group of 12 claims, immediately north of the mine, which will provide protection for the orebodies at depth.

★ Hydroelectric power was turned on at the Snow Lake property of Howe Sound Exploration Co., Ltd.,

on March 16. Shaft sinking, started by diesel power, has now reached a depth of 100 ft., with an initial objective of 950 ft. Sinking may be expected to proceed at an accelerated pace.

★ The following is a summary of the more recent drilling results obtained on the "L" orebody at Lynn Lake by Sherritt Gordon Mines, Ltd.: Hole No. 166, 95 ft. to 627 ft., 3.75% nickel and 1.28% copper; hole No. 167, 39 ft. to 632 ft., 3.54% nickel and 1.20% copper; hole No. 168, 26.5 ft. to 369 ft., 1.64% nickel and 0.70% copper; hole No. 169, 116 ft. to 596 ft., 3.73% nickel and 1.33% copper; hole No. 170, 143.5 ft. to 478 ft., 2.01% nickel and 0.73% copper; hole No. 171, 71 ft. to 98.5 ft., 5.53% nickel and 0.92% copper (to be deepened); hole No. 172, 205 ft. to 405 ft., 3.88% nickel and 1.41% copper; hole No. 174, 21 ft. to 167 ft., 3.19% nickel and 0.81% copper; hole No. 175, 124 ft. to 315 ft., 4.26% nickel and 1.6% copper; hole No. 176, 176 ft. to 354 ft., 4.79% nickel and 1.57% copper. All holes are vertical and spaced at 50-ft. intervals.

E. L. Brown, president of the company, has recently issued a specific denial that there are any plans for the immediate refinancing of Sherritt Gordon Mines.

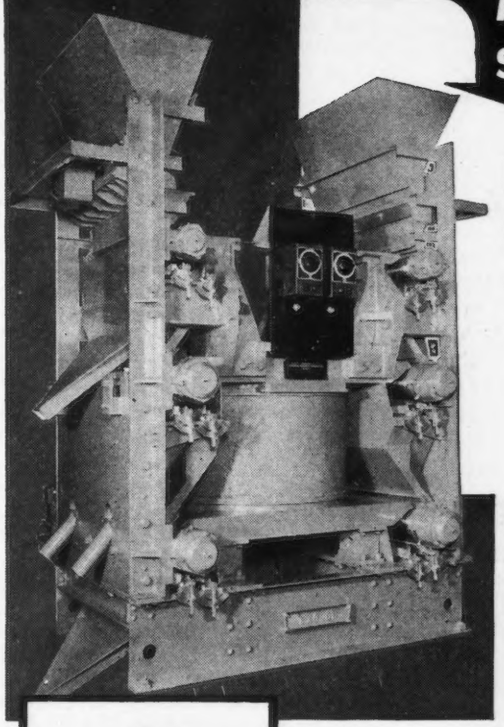
★ The Department of Mines and Natural Resources has announced an expanded program for the coming field season. Seven geological survey parties will conduct mapping. Three parties will continue work in the Lynn Lake area. One party will work in the Bird-Maskwa River area, the scene of former discoveries of lithium, chromium, and copper-nickel. Plans for the immediate development and production of the large lithium deposits in this area have recently been formulated as a result of negotiations with the Lithium Corporation of America. Other parties will be engaged in a portion of the Central Manitoba-Rice Lake area and in the vicinity of God's Lake.

BRITISH COLUMBIA

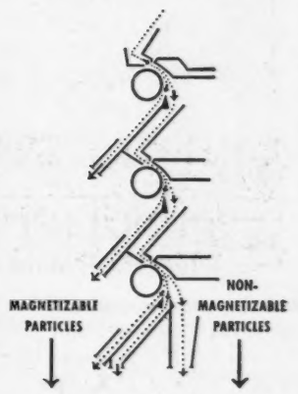
★ A renewal of the campaign conducted last year by the International Union of Mine, Mill and Smelter Workers to attain industry-wide recognition is foreshadowed by the bitter attack now being directed against Consolidated Mining & Smelting Co. for alleged failure to live up to an agreement promising "check-off" of union dues. It is considered probable that the union is preparing to advance demands for substantial pay increases.

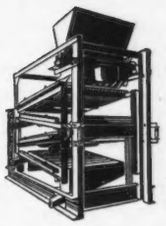
★ Further increases in copper prices have resulted in the declaration of two extra copper bonuses payable to employees of Britannia Mining & Smelting Co., Ltd., and Granby Consolidated Mining, Smelting &

The EXOLON High Intensity Induction MAGNETIC SEPARATOR



INCREASES YIELD
IMPROVES QUALITY
of weakly magnetic materials





For fast, accurate and economical grading of dry granular materials, write for data on the Exolon Multiform Grader.

● The Exolon High Intensity Induction Magnetic Separator is saving thousands of dollars for companies dealing in materials susceptible to improvement by magnetic separation through: . . . increasing yields . . . increasing the quality of concentrates . . . recovery of valuable materials.

As illustrated above, the material falls on a magnetized rotor and the trajectory of any magnetic particles is altered. A knife edge is set to make the best separation. The strength of the magnetic field is increased from rotor to rotor to affect the less and less magnetically susceptible particles until all magnetic material has been removed from the stream.

The first separators were developed to improve Exolon abrasive grains since no machines were available which would give the desired results. The unique features were patented and this outstanding separator was made commercially available.

Write today for complete literature covering various models of the Exolon High Intensity Induction Magnetic Separator and Exolon laboratory service.

THE EXOLON COMPANY
946 East Niagara Street, Tonawanda, New York
Manufacturers of SILICON CARBIDE and ALUMINUM OXIDE ABRASIVES

MANAGEMENT and PRODUCTION men want

FACTS

about equipment they buy

Here are FACTS about

Coffing Hoists

"SAFETY-PULL"
Ratchet Lever Hoists

For all kinds of construction and maintenance work, wherever a lift or pull is needed, there is a "Safety - Pull" to meet your requirements. SAFE, DURABLE, DEPENDABLE. Capacities range from ¾ to 15 tons, yet they weigh only 14 to 150 pounds.

"QUIK-LIFT"
Electric Hoists

For dependable and economical service the "Quik - Lift" incorporates EFFICIENCY with SPEED, POWER and DURABILITY. Just plug it in and speed up production. Capacities from 500 to 4000 pounds with lifting speeds from 4 to 49 feet per minute.

MODEL Y-C
Spur Geared Chain Hoists

Coffing Spur Geared Chain Hoists embody the planetary gear system with the Weston automatic brake. There are seven capacities ranging from ½ to 5 tons. A sturdy, dependable hoist for heavy work and in the production line.

Contact Your Supplier or Write for BULLETIN I

Coffing Hoist Co.
Danville, Illinois U. S. A.

Canada *(continued)*

Power Co., Ltd. The terms of last year's strike settlement provided that *Engineering and Mining Journal* quotations would govern payments. A total of seven bonuses of 25c. per day each are now being paid. At present the basic miner's wage plus bonus amounts to $8.51 on day shift, $8.75 on afternoon shift, and $8.91 on night shift. Underground workers are still in short supply throughout British Columbia.

★ Reeves MacDonald Mines, Ltd., has announced that development of the company's property in the Salmo district will be resumed immediately, with Henry L. Hill as manager. Drifting and diamond drilling have previously indicated 2,000,000 tons of ore averaging 6.6% zinc, 1.5% lead, and 0.5 oz. silver per ton in the principal ore zone. Two other major occurrences remain to be explored. Present plans call for construction of a 1,000-ton milling plant. Reeves MacDonald is controlled by Pend Oreille Mines & Metals Co., Metaline Falls, Wash.

★ Bralorne Mines, Ltd., reports a 1946 net profit, before depletion, of $197,148.20. Austin C. Taylor, president, advised shareholders that resumption of dividends is dependent on favorable economic factors, of which the major one is an adequate supply of miners. Plans are being made to commence development on holdings in the Yalakom River area. Work on claims held in Ontario, delayed by the war, has now been undertaken in association with Macassa Mines. Ltd., and Mining Corporation of Canada, Ltd. Two operating companies have been formed: Braminco Mines, Ltd., and Baltic Mines, Ltd. Low gold values over fair widths have been disclosed at the former property by diamond drilling.

Bralorne's ore reserves on Jan. 1, 1947, were estimated as 1,070,000 tons averaging 0.51 oz. gold per ton, compared with 1,088,000 tons of 0.503 oz. ore at the start of 1946. Production for the year aggregated 64,534 tons.

★ Ore reserves of Silbak Premier Mines, Ltd., at the end of 1946 were estimated as 73,341 tons averaging 0.25 oz. gold and 2.51 oz. silver per ton, plus a small percentage of lead. In the company's annual report for 1946, R. F. Goodwin, president, stated that new ore was not found in sufficient tonnage to replace that drawn from the mine. Net loss reported for the year was $140,045. Recovery amounted to 7,978 oz. gold, 38,787 oz. silver, and 1,174,947 lb. of lead from 34,804 tons of ore.

★ The annual report of Mining Corporation of Canada, Ltd., for 1946 informed shareholders that Mining Corporation has disposed of its shares of Base Metals Mining Corporation, former lead-zinc producer at Field, B. C. Control of Torbrit Silver Mines, Ltd., 17 miles north of Alice Arm, was acquired. The Torbrit mine has already been developed by two tunnels, an internal winze, and a large amount of diamond drilling, indicating an orebody containing 430,000 tons averaging 19.3 oz. silver per ton after allowing for dilution. It is considered probable that drilling below the winze level will increase the ore-reserve figure. It is planned to construct a 300-ton flotation-cyanidation mill. It is not expected that the production stage will be reached before the middle of 1948.

★ Reporting on operations of Island Mountain Mines Co., Ltd., for the year ended Dec. 31, 1946, F. W. Guernsey, president, states that operations were seriously curtailed in 1946, first by the shortage of labor during the early part of the year and second by the closing of the mine owing to a general strike of miners in British Columbia. Production for the year was 9,299 oz. of gold and 1,239 oz. of silver, valued at $353,319, from 20,807 tons milled. Net profit was $57,231. Ore reserves at the end of the year were estimated at 63,000 tons averaging 0.473 oz. gold per ton. Dividends of 7c. per share were paid ing the year for an aggregate distribution of $73,550.

★ Extension of the "18" drift on the "B" level at the Tulsequah property of Polaris-Taku Mining Co. Ltd., has provided encouraging results. Widths of from 5 to 10 ft. of ore grading upwards of 0.5 oz. gold per ton have been opened. Good values have also been obtained recently in the "A" vein on the 300 level.

★ The Emerald tungsten mine, situated near Salmo, is scheduled to come into production during May. The property was recently purchased by Placer Development, Ltd., through a subsidiary company, Canadian Exploration, Ltd., from War Assets Corporation.

★ Dr. W. B. Burnett, president of Cariboo Gold Quartz Mining Co., Ltd., has advised that a new five-compartment shaft will be sunk from the 1,500 level near the "B.C." vein. A total depth of 2,500 ft. is planned, with an initial objective of 1,500 ft. Extension of the shaft will permit lateral development 1,000 ft. below the present lowest level.

★ Pellaire Gold Mines, Ltd., in the Taseko Lake district, jointly financed by Noranda Mines, Ltd., and Quebec Gold Mining Corporation, will resume underground development about May 15. Good results were obtained during 1946 in drifting on the No. 3 vein. Samples over a length of 70 ft., with widths up to 20 ft., assayed 0.23 oz. gold and 1.2 oz. silver.

★ Increasing interest in the area at the headwaters of the Skeena River, north-central British Columbia, is being shown by prospectors and exploration companies. Recent reports from the district claim rich lode-gold deposits have been found in the Sustut-Johanson-Aiken lakes area.

YUKON

★ Increased mining activity throughout Yukon Territory during 1947 is indicated in a recent report issued by J. E. Gibben, acting controller. During 1946, gold production from placer operations showed a substantial increase over the previous year's record, staking was extended over a wider field, and a renewed interest in lode mining was disclosed.

Placer production was principally confined to the operations of Yukon Consolidated Gold Corporation, Ltd., with six dredges working, and Clear Creek Placers, Ltd. The latter company plans to operate three dredges this year on Clear Creek, Thistle Creek, and Henderson Creek.

★ Keno Hill Mining Co., Ltd., owner of the former Treadwell-Yukon properties in the Mayo district, is reconditioning the Elsa mill with the intention of shipping concentrates at an early date. The Keno Hill company holds 24 claims on yearly renewal and 63 claims on 21-year Crown leases on Galena Hill and Keno Hill. A crew of approximately 150 men will be employed during 1947.

★ Yukon Northwest Explorations, Ltd., is driving a 600-ft. tunnel to intersect a vein which gave samples assaying up to 600 oz. silver per ton in an orebody exposed by surface trenching on the "Blueroc" group of claims. The company also has a small crew engaged in work on the "Keno" group on the northeast slope of Galena Hill. Boyle Mining Co., of Haileybury, Ont., plans to prospect during the coming summer on a group of claims staked by Ventures, Ltd., in the Beaver River district. Noranda Mines, Ltd., is working on several groups of claims on Galena Hill and Keno Hill.

★ Staking and prospecting in the area adjacent to the Alaska Highway is being continued by Hudson Bay Exploration & Development Co., Ltd., Transcontinental Resources, Ltd., and Western Ranges Prospecting Syndicate (Ventures, Ltd.). A group of United States Army officers previously stationed in the area plan to develop 42 claims near the Aishihik airport, north of the highway.

MEXICO

Aleman promises silver coinage this summer—Monterrey iron and steel plant pays dividend

★ President Miguel Aleman has given official assurance that Mexico will coin about 40,000,000 pesos in one-peso and five-peso pieces, probably beginning in August. This announcement cheered somewhat those Mexican silver miners who have been disturbed of late by the lower price of silver and the "dwindling market" for the metal. There are many, however, who

In Atlas Locomotives' performance you'll find an extra measure of economy and endurance—construction of a design and quality that keeps these locomotives on the mainline, working efficiently day after day.

ATLAS
TYPE "A" LOCOMOTIVES

"3 and 4 ton sizes for 18 gauge"

Atlas Locomotives are available in standard sizes to fit specified track gauge. If you have special requirements the Atlas Co. will cooperate to produce the locomotives you need.

THE ATLAS CAR & MFG. Co.
CLEVELAND 10, OHIO
CANADIAN REPRESENTATIVES
Mine Equipment Co., Kirkland Lake, Ont. International Agencies & Machinery Co., Ltd., Vancouver, B. C.

WE STUDY YOUR PROBLEM

PLANT DESIGNING
PROCESS & EQUIPMENT
DEVELOPMENT

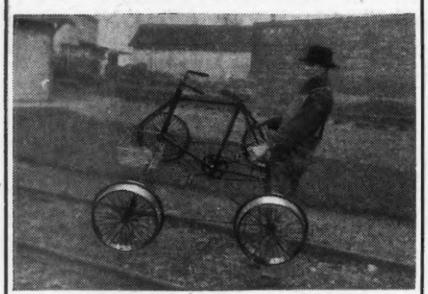
FROM END TO END

BOOTH ENGINEERS
F. C. TORKELSON CO.
ASSOCIATED ENGINEERS
METALLURGICAL AND DESIGNING ENGINEERS
FIFTH FLOOR PACIFIC NATIONAL LIFE BLDG. SALT LAKE CITY-1-UTAH

SHAWINIGAN CARBIDE Produces Good Acetylene Gas

SHAWINIGAN PRODUCTS CORPORATION
1317 EMPIRE STATE BLDG, 350 FIFTH AVENUE, NEW YORK 1.N.Y.

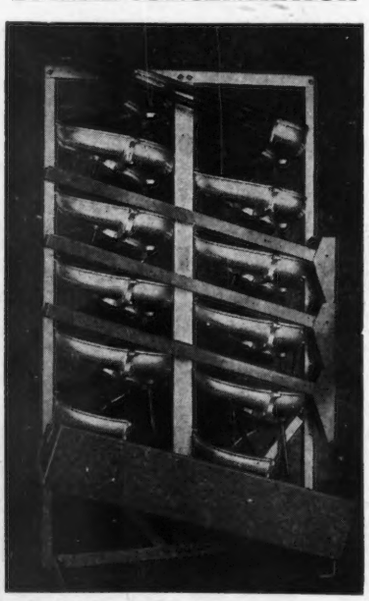
Light
INSPECTION
Cars



TEETOR Light Inspection Cars afford fast, safe transportation for superintendents, shift bosses, engineers, samplers. Practical features include substantial tubing construction throughout and ball bearing rubber tred wheels. Cars are available in single or double-seat models for any track gauge from 18 inches to 6 feet; gear ratio of 50 inches, to meet every grade condition. Write for detailed information.

LIGHT INSPECTION CAR WORKS
Hagerstown Indiana

HUMPHREYS
SPIRAL CONCENTRATOR



LOW COST OF INSTALLATION
NO MOVING PARTS
LOW OPERATING COST

Engineering Division
The Humphreys Investment Co.
First National Bank Building
DENVER 2, COLORADO

Mexico *(continued)*

recognize that recent recessions mark merely a retreat from an inordinately high peak, and that the market at the moment at least (April 17) is holding its own.

★ The Mexican Miners' Union has announced plans to bring together representatives of Western Hemisphere labor organizations in the mining field in order to draw up a program for united action of mining labor.

★ A bill calling for the unification of all mining cooperative societies in Mexico into one big cooperative has been filed with the congressional cooperatives committee. Sponsors are Manuel Franco Lopez, Francisco Fernandez, and Felipe Bracho Valle, all mining engineers, and Manuel Zumaya Ochoa and Baltasar Baca, mining accountants. Object of the consolidation would be to achieve operating economies and improve technical administration.

★ The Monterrey iron and steel plant announced recently that production in 1946 reached 112,000 tons of steel products, most of which was in the form of rails for the National Railways and bars and balls for mining companies. The company paid a 9% dividend last year. Average wage paid was 17.17 pesos ($3.63) per day.

CHILE

Gold brings record price at Santiago auctions—Copper tax called for year earlier

★ The copper companies in Chile have been paying a special tax of half of the income received from sales of the metal in excess of a price of 10¢ per pound. This tax was paid in two installments during the year following that in which the income was earned. A new law, enacted March 12, has altered this tax so that it will be paid when the price rises above 13½¢, but the tax must be paid within the year when the copper is sold and at such times as the President of Chile designates.

It is believed that he will call for quarterly payments, which will be on a provisional basis, with final settlement to be made during the following year.

It has been estimated that if the production of copper by the three United States companies reached 400,000 metric tons in 1947, and if the price of copper averages 20¢ for the year, the Chilean Government will receive about $44,000,000 from the single tax mentioned in the foregoing paragraph. Altogether, Chile would receive about $115,000,000 in foreign exchange from these three companies in 1947; $60,000,000 in taxes, and $55,000,000 as the cost of production within the country.

★ For more than two years, gold coins containing 18.3 grams of fine gold have been auctioned almost daily at the stock exchanges of Valparaiso and Santiago. Recently these coins sold at the record high of 1,060 pesos per coin, which is equivalent to 58 paper pesos per gram. At the official exchange rate of 31 pesos to the dollar, this price is the equivalent of about $56 per ounce.

★ The year 1946 was a poor one for Chile so far as copper production from the three large companies was concerned. Because of strikes, production was held to 358,964 metric tons of copper. The best year so far has been 1943, with 489,320 tons of copper. Revenue to the Government from this source in 1946 was $18,148,321, or 2.3¢ per pound, against $25,381,000 in 1943. Cost of production in Chile for the three companies was $42,425,000 in 1946, or 5.36¢ per pound of copper, against 4.0¢ in 1943.

★ Cia. Minera Aysen, with a lead-zinc deposit near Lago Buenos Aires, in the province of Aysen, has sufficient lead ore blocked out to feed a 30-ton mill, and construction of such a unit is under consideration. Several factors, such as remote location, will combine to keep capital cost high.

PHILIPPINES

Atok again producing — Benguet cuts new oreshoot—No more work planned at Demonstration

★ Atok Mining Co., which operates the Big Wedge mine, at Baguio, resumed production on March 17 after more than 18 months of rehabilitation work on the first of the mill's two units, which will permit treating 225 tons per day. The second and larger unit may be in action in another month. Plans are made to enlarge the mill to between 800 and 1,000 tons daily if mine development justifies it. Rehabilitation was more expensive than originally estimated, partly because of increased labor costs and partly because more new equipment had to be ordered than had been counted upon. For example, the diesel engines appeared sound, but it was later found that the Japanese had run them by using cocoanut oil both as a fuel and as a lubricant, and all the bearings had to be replaced. In the Muyot tunnel, all timbers and rails had to be replaced, and new 20-cu.ft. dump cars had to be purchased. A new interior shaft, to be known as Keystone No. 3, will be sunk to serve as the main hoisting shaft. With self-dumping skips, it will have a maximum capacity of 1,000 tons per 24 hours. The company plans to mill at once about 4,000 tons of rejects left from the rich ore that was high-graded during the occupation years.

★ Benguet Consolidated reports that

excellent progress is being made in mine rehabilitation and that the new mill project is 30% assembled on a 1,200-ton basis. Milling may begin in September. The company has already spent $2,000,000 in mill construction and expects to spend $1,000,000 more. In driving the Benguet tunnel recently a new oreshoot was cut that may be a split from the Keystone vein. It carries $9.10 per ton across a width of 8 ft., with lower-grade ore over an additional 6 ft.

★ Baguio Gold Mines has 85 miners working three shifts in the mine on rehabilitation. They have cleaned up more than 1,500 ft. of the main haulage tunnel and have repaired the road to the mill site. The old mill was completely destroyed by bombing.

★ Demonstration Mines is reconditioning its mill and power plant, but no effort has been made to open the mine. It appears likely that the equipment will be sold to other companies.

★ At Itogon only salvage work proceeds. It is stated that high costs of labor and supplies prohibit immediate resumption of work at the property.

★ Lepanto Consolidated is actively engaged in rehabilitation of the mine and construction of a new 500-ton mill. The Japanese are said to have obligingly opened up some new ore in the mine assaying 9% copper across a 25-ft. face.

★ Batong Buhay, about 220 km. north of Baguio, is apparently in excellent condition so far as surface plant goes. Work goes on in the main haulage tunnel, which has been opened up for about 1,300 ft., with little caving. The Bureau of Public Works has begun repair of the road to the mine.

★ Far East Oil Development has received its heavy drilling equipment from the United States and is setting it up. Oil showings in the first well drilled by the company were encouraging, but at the start of the war the well was destroyed. The new well may be 8,000 to 10,000 ft. deep.

AFRICA

Miners' strike ends—Mines show loss in February—Coal still short in Rhodesia

★ The strike of the European mine workers on the Rand, which began on Jan. 27, came to an end on March 17, but the effects of it will be felt for some time. Although the strike was confined to those miners who disagreed with the policy of the Mine Workers Union, gold production fell off at nearly all mines. The strikers, organized as the United Mine Workers Committee, finally reached an agreement with the Mine Workers Union whereby the Union was to urge the Chamber of Mines to reemploy strikers, to ask the Government to push its plans for a Commission of Inquiry, and to hold a referendum among employees on the voting power of mine union officials. The dispute originally arose over the right of paid union officials to vote at meetings. Actually, the split in the union membership goes much deeper, and involves South African politics. The strikers are believed generally to belong to the Nationalist party, which opposes the policies of the present Government. Whether the Chamber of Mines will reemploy strikers remains to be seen. Because of some reorganization undertaken during the strike, it seems almost certain that not all strikers will be taken back, at least not in their old jobs.

★ Because of the strike, gold production fell off in February more than 42%. Output in February was 572,720 oz., compared with 972,212 oz. in January. Heaviest hit was Daggafontein, the production of which dropped 35,744 oz. to 7,425 oz. Grootvlei, East Geduld, and West Rand Consolidated were off nearly 30,000 oz. each. Crown Mines and Government Areas, both ordinarily among the largest producers, dropped 16,369 oz. and 10,317 oz., respectively. Net loss for February for all Rand mines was £248,804.

★ Manganese mines in the Union of South Africa are enjoying great activity, one producer reporting that his exports now run about 12,000 tons a month of ore carrying between 36 and 55% manganese, with local users taking about 3,000 tons. Freight rates are lower to the United States than to England or the Continent. Manganese is mined in the Postmasburg area, 150 miles west of Kimberley. The two main companies are Associated Manganese and South African Manganese, which between them employ about 300 Europeans and 3,500 natives.

★ Although both Nchanga and Nkana, copper mines in Northern Rhodesia, have resumed full production after the shutdown in the first week of March for lack of coal, fuel supplies are still so low that another stoppage might occur at any time. The coal shortage is caused by a lack of cars on the local railways.

Backed by 25 Years Experience with Storage Battery Locomotives

2-motor drive; total 24 h.p.

Series parallel controller.

Extra long journal springs for better trackability.

Oil-tight, leakproof transmission. Use auto oil, renew every 6 months.

Adjustable Timken Roller Bearings throughout.

Strong, simple construction. Low maintenance.

GREENSBURG "RANGER"

The Sunshine Mining Company, Kellogg, Idaho has three of our locomotives which have contributed materially toward decreasing their haulage cost. This is a custom-built job.

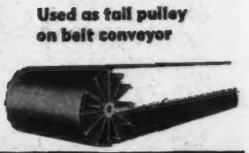
All Greensburg Locomotives are CUSTOM-BUILT *to your requirements.*

GREENSBURG MACHINE CO. 102 STANTON ST. GREENSBURG, PA.

Sprout-Waldron "Belt-Saver" Pulleys increase the life of a belt from 50 to 400%. In handling any material on conveyors, almost always some of the material dribbles off the top belt, falls onto the lower belt and is carried into the tail pulley. The resulting grinding or crushing action common with ordinary pulleys is eliminated by the Sprout-Waldron "Belt-Saver" Pulley with its unique, patented design.

Used as an elevator pulley

Used as tail pulley on belt conveyor



SPROUT-WALDRON & CO.

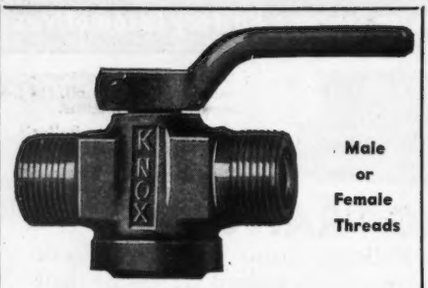
Manufacturing Engineers

MUNCY PENNA.

AUSTRALIA

Zinc Corporation, New Broken Hill plan expansion—Gold slow in come-back in Kalgoorlie

★ In an unusual interim statement between annual meetings, Zinc Corporation, Ltd., and New Broken Hill Consolidated announced detailed production targets for both concerns over the period to 1955. Compared with a 1946 output of 490,000 tons of ore, including 42,000 tons from New Broken Hill



Male or Female Threads

Recognized Universally as the ULTIMATE in Valves and Couplings

KNOX MANUFACTURING CO.

812 CHERRY ST., PHILA. 7, PA.

Since 1911 Producers of

KNOX

Valves - Couplings - Nipples - Clamps - Menders

CHAMPION

◆ DIAMOND ◆

CORE BITS

LAST LONGER

CASING BITS — CORE BITS — REAMER SHELLS

THREE TYPES —

BRONZE MATRIX COREBIT for solid rock and softer formations.

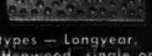
NICKEL MATRIX COREBIT for drilling difficult formations.

TUNGSTEN MATRIX COREBIT for extremely hard or broken formations too tough for any other type.

We also make

DIAMOND CASING BITS and REAMER SHELLS

with "Champion" Diamond Inserts, 1" long, 3/8" wide, 3/32" thick



In three types — Longyear, Sullivan and Sprague & Henwood, single or double tube. CHAMPION DIAMOND INSERTS brazed in your special shells, or available unattached for your own brazing.

SEND FOR THE CHAMPION DIAMOND CATALOG AND PRICES.

CHAMPION DIAMOND CO. INC.

551 Fifth Avenue

NEW YORK 17, N. Y.

Cable Address — WILLARTZ NEW YORK

Australia (*continued*)

leases, the 1955 objective is 1,023,000 tons, of which 330,000 tons would come from New Broken Hill. Most of the planned expansion will take place at New Broken Hill, which last year began drilling from surface at a point 3,000 ft. from the southern Zinc Corporation boundary. Several good intersections assaying high in lead, zinc, and silver have been found.

WESTERN AUSTRALIA

★ Gold production for the State in 1946 was 610,874 oz., compared with 463,521 oz. in 1945, both of which are far below the prewar level of 1,200,000 oz. Handicaps have been chiefly slowness in return of labor to gold mining, and equipment and supply shortages. If the industry is to increase production, many observers feel that labor must be less exacting in its demands for shorter hours and more pay and the Government must modify its present tax policies.

★ Lake View & Star, Ltd., the big mine of the Kalgoorlie field, reports as of June 30, 1946, that it has among its several mines and leases a total reserve estimated at 3,949,100 tons containing 4.93 dwt. gold per ton. The mill treated 383,081 tons; head assay, 5.10 dwt.; recovery, 92,961 oz. of gold. In addition, 669,167 tons of accumulated tailings were cyanided and 11,715 oz. recovered thereby. Costs increased from 22s. 9.6d. in 1945 to 23s. 5.35d. per ton.

★ Improved labor supply has permitted South Kalgurli Consolidated, Ltd., to increase development footage and sink the main shaft to a depth of 2,128 ft. Ore milled amounted to 72,662 tons assaying 5.58 dwt., which yielded 18,853 oz. The company was the last on the Kalgoorlie field to give up the old dry-crushing, roasting, and cyaniding process. South and North Kalgurli companies now operate jointly a new mill using wet crushing, flotation, roasting, and cyanidation.

TASMANIA

★ Mt. Lyell Mining & Railway Co., Ltd., Queenstown, is purchasing equipment in order to increase output. Worked principally by open-pit methods, the mine has ore reserves of 35,092,000 tons carrying 0.77% copper, 0.045 oz. silver, and 0.0084 oz. gold. In the mine, a new 2½-cu.yd. electric shovel, two bulldozers, and ten 20-ton trucks have been purchased. In the mill, another 10x7-ft. ball mill plus classifier and an 84x60-in. jaw crusher have been added. The effort is being made to cut costs, because of the decreased grade of ore.

QUEENSLAND

★ Mt. Isa Mines, Ltd., in North Queensland, resumed last year the production of lead bullion and zinc concentrate, but output was curtailed by coal shortages and the number of special holidays. Labor was still in short supply, and the turnover for the year reached the high figure of 80%. Ore production was 198,171 tons of copper ore and 55,113 tons of lead-zinc ore. The company plans to add to its facilities both in milling and smelting.

NORTHERN TERRITORY

★ Great interest is shown in mining in the Northern Territory at various times, but it is usually discouraged by adverse taxing and metal-pricing policies of the Government. The most important present center of mining in the region is at Tennant Creek, where four private companies operate mills, and the Government operates three mills. Gold production last year was about 129,000 oz. The largest mine is Eldorado Tennant Creek, Ltd., which has opened up an orebody to a depth of 307 ft., and is mining ore averaging 35 dwt. gold per ton.

NICKEL FOR THE SOVIETS is produced in this plant of the Southern Urals Nickel Works near Orsk, northeast of the Caspian Sea at the southern tip of the Urals. Said to be the largest enterprise of the USSR's non-ferrous metals industries, the Orsk works are being expanded and new shafts being sunk in the area.